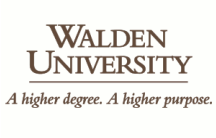

2019

Late-Stage Breast Cancer Diagnosis Among Haitian Women in the United States

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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2018

Abstract

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by

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MPH, Loma Linda University, 2011

MBA, Loma Linda University, 2009

BA, University of Michigan, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Breast cancer is the 2nd leading cause of death among women. While a significant amount of research has been done to understand the different disparities related to this disease, there is still more to learn about the relationship between a person's nationality and the staging of breast cancer. Using the Surveillance, Epidemiology, and End Results Program as the data source, this retrospective cohort study was aimed at assessing late-stage breast cancer among Caribbean immigrants, specifically comparing Haitian women with Americans and other immigrant populations in the United States. The research questions addressed the link between nationality and the likelihood of late-stage breast cancer diagnosis as well as the risk factors associated with an advanced stage of breast cancer. Findings from logistic regression analyses indicated no statistically significant difference in Stage IV diagnosis between women born in Haiti and U.S.-born women, while the converse was true for women born in other foreign countries. The results also suggested that race, Hispanic ethnicity, marital status, insurance coverage, being unemployed, and language isolation were significant predictors of late-stage breast cancer diagnosis ($p < 0.05$). When stratifying the analyses by nationality, marital status and poverty were the common predictors of advanced breast cancer diagnosis among Haitian, foreign-born, and U.S.-born women. The observed disparities confirm the need for additional efforts that seek to improve screening rates among underserved groups and ultimately reduce the burden of late-stage breast cancer.

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Dedication

This dissertation is dedicated to my late father, Naasson B. Prosper; my mother, Naomie B. Prosper; and my late brother, Jean B. Prosper.

Acknowledgments

The completion of this work would not have been possible without the guidance and support of my dissertation committee. Drs. Amy Thompson, Shingairai Feresu, and Michael Furukawa, thank you so very much. Infinite gratitude to my family and friends who are my constant rays of light. I am also eternally grateful to those who laid the groundwork for me to be where I am today. Thank you all!

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Introduction

The stage at which breast cancer is diagnosed impacts the outcome of a woman's survival. The American Cancer Society (2014a) reported a 5-year relative survival rate of 100% for Stage 0 diagnoses and 22% for the more advanced Stage IV, suggesting that early detection improves the likelihood of survival. Timely screening can result in early diagnosis when treatment alternatives are more effective (American Cancer Society, 2013a). The American Cancer Society (2013a) indicated that African American women have a lower 5-year survival rate compared to their White counterparts (79% versus 92%). In fact, many studies such as Bradley, Given, and Roberts (2002), Newman (2005), Maloney et al. (2006), and Vona-Davis and Rose (2009) focused on racial and ethnic differences relative to breast cancer incidence, mortality, and screening. In spite of the wealth of knowledge available with regards to breast cancer, there is still more to be explored regarding the breast cancer experience of women of different nationalities who live in the United States.

The purpose of this study was to investigate late-stage breast cancer diagnosis among Haitian women in the United States as compared with other foreign-born women and those born in the United States. Kobetz et al. (2009) studied Haitian women in the state of Florida and found that their rate of advanced breast cancer diagnosis was among the highest compared to all other races and ethnic groups. Further research is needed to help reduce the burden of late-stage diagnosis in this population and identify some of the

factors that place these women at a higher risk with the goal of improving their screening utilization.

In the remainder of this chapter, I will introduce the key components of this research, which will also be discussed in detail in subsequent chapters. Following the background of the topic under study will be a statement of the problem, the purpose of this study, its research questions and hypotheses, the theoretical framework used to ground the study, and a discussion of the study design. Also included in the chapter will be pertinent definitions, the assumptions, scope and delimitations, limitations, and the potential contributions of the study to knowledge and positive social change.

Background

Breast cancer is a significant health concern for women in the United States that has the potential to be treated if caught at an early stage. Recent trends of the disease suggest that it is on the decline. After annual increases of 0.4% from 1975 to 1990, breast cancer deaths decreased by 2.2% each year thereafter (DeSantis, Siegel, Bandi, & Jemal, 2011). In evaluating the trend of this disease relative to race and ethnicity, the Centers for Disease Control and Prevention (CDC; 2010) reported that from 1997 to 2007, White women had the highest yearly incidence of breast cancer followed by African American women; however, the converse was true for mortality rates. Although African Americans have a lower incidence than White women, their age-adjusted mortality rates are considerably higher; this same pattern is also evident in their survival rates (Byers et al., 2008; CDC, 2010; Newman, 2005). In fact, the American Cancer Society (2013c) asserted that breast cancer death rates are 41% higher among Black/African American

women compared to their White/European American counterparts. These sources provide strong evidence for the presence of health disparities as they relate to race/ethnicity. Previous research also supported the presence of breast cancer disparities relative to socioeconomic status and immigration status (Bradley et al., 2002; Maloney et al., 2006; Vona-Davis & Rose, 2009).

In the past, many studies aimed at understanding breast cancer incidence, mortality, and screening practices by race/ethnicity; however, little is known about the variations that may exist in Black women of different nationalities (American Cancer Society, 2013a; Bradley et al., 2002; CDC, 2010; Edwards et al., 2010; Lantz et al., 2006; McCarthy, Yang, & Armstrong, 2015; Vona-Davis & Rose, 2009). In this study, I focused on Haitian women, who according to Kobetz et al. (2009), have among the highest rates of late-stage breast cancer diagnosis (i.e., Stages III and IV) in the state of Florida. More specifically, with this study, I endeavored to understand the risk of late-stage breast cancer diagnosis in this nationality compared to other foreign-born populations and the United States.

Problem Statement

Breast cancer poses a health risk for women, with advanced stages of the disease known to result in unfavorable health outcomes. Current statistics indicate that 1 in 8 women will develop breast cancer, over 2.9 million women have a history of this illness, and in 2013 alone, an estimated 39,620 died from it (American Cancer Society, 2013; National Cancer Institute, 2012a). Although breast cancer is more common in White women (National Cancer Institute, n.d.a.), several research studies have suggested that it

is not immune to health disparities (Bradley et al., 2002; Byers et al., 2008; Maloney et al., 2006; Vona-Davis & Rose, 2009). Byers et al. (2008) found that women of higher socioeconomic status have a higher incidence of the disease, while those of lower socioeconomic status have lower survival rates. In addition, Black women in the United States have a lower burden of breast cancer compared to Whites, yet their mortality rates are significantly higher (CDC, n.d.). An unequal distribution of breast cancer is also observed relative to immigration status. Meade, Menard, Thervil, and Rivera (2009) asserted that fewer immigrant women have the disease, but their mortality rates are disproportionately higher than nonimmigrant women.

Of interest for this study, was the pattern of breast cancer among Haitian women. Kobetz et al. (2009) asserted that compared to all other racial and ethnic groups, this group of women have a disproportionately higher proportion of late-stage breast cancer diagnosis in the state of Florida. However, little is known on how they fare across the United States. In this research study, I sought to fill this gap in knowledge by assessing late-stage breast cancer risk in Haitian women in the United States as compared to women who are non-Haitian, foreign born and those who are born in the United States.

Purpose of the Study

In this quantitative, retrospective study, I aimed to explore the risk factors associated with an increased risk of late-stage breast cancer diagnosis in Haitian women to see how they compare with other foreign-born groups and individuals born in the United States. Risk factors assessed included demographics, socioeconomic factors, acculturation and breast cancer screening.

Nature of the Study, Research Questions, and Hypotheses

This study was based on data obtained from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program from 2000 to 2013. Thus, the study design was a quantitative, retrospective cohort design, whereby the outcomes and exposures of a group of individuals are studied post hoc (see Szklo & Nieto, 2014). This research design assisted in answering the research questions that I developed seeking to elucidate the patterns of late-stage breast cancer risk relative to nationality, demographics, and socioeconomic factors. The dependent variable assessed in the analyses was late-stage breast cancer. Nationality and race/ethnicity were the independent variables. I controlled the analyses for the effects of demographic factors (i.e., age, marital status, etc.); health insurance status; socioeconomic variables, such as education and poverty status; acculturation as measured by language isolation; and breast cancer screening behaviors. I developed the following research questions and their associated hypotheses to guide this study:

Research Question 1: Is there a relationship between nationality and the likelihood of late-stage breast cancer?

$H_0$1: Haitian women are not more likely than other nationalities to be diagnosed with breast cancer at a late stage.

$H_1$1: Haitian women are more likely than other nationalities to be diagnosed with breast cancer at a late stage.

Research Question 2: What is the association between late-stage breast cancer diagnosis risk and demographics, socioeconomic factors, acculturation, health insurance status, screening, and nationality?

$H_0$2: There are no differences in the risk factors associated with late-stage breast cancer diagnosis relative to nationality.

$H_1$2: There are differences in the risk factors associated with late-stage breast cancer diagnosis relative to nationality.

Theoretical Framework for the Study

According to Glanz and Bishop (2010), a theory is "a set of interrelated concepts, definitions, and propositions that explain or predict events or situations by specifying relations among variables" (p. 401). Having a better understanding of behaviors through the lens of theories can be effective in developing appropriate research, interventions, policies, and health messages that will result in positive behavioral and social change. This study was based on the socio-ecological model, which postulates that there are multiple levels of influence on behavior and that there is a reciprocal causation between the individual and the social environment (Simons-Morton, McLeroy, &Wendel, 2012).

Simons-Morton et al. (2012) described a seven-level model that informed this research. These levels of influence are: intrapersonal, interpersonal, organizational, community, public policy, physical environment, and culture (Simons-Morton et al., 2012). The intrapersonal level incorporates an individual's knowledge, attitudes and skills, while the interpersonal relates to a person's family, friends, and social networks (Simons-Morton et al., 2012). Churches and schools are examples of organizational

elements, and community characteristics can include factors such as community values and resources or the relationships between community organizations (Simons-Morton et al., 2012). Public policy refers to the laws and regulations that support health and healthful behaviors, and the physical environment includes transportation infrastructure, land use, neighborhood design, and the accessibility of community resources (Simons-Morton et al., 2012). Hruschka and Hadley (2008) defined culture as a "shared system of learned norms, beliefs, values and behaviors that differ across populations defined by regions, nationality, ethnicity, or religions" (p. 947). Factors from each of these levels can affect a woman's screening behaviors, which can in turn influence the stage at which breast cancer is diagnosed. Using nationality as a proxy for culture, in this study I explored whether the risk of breast cancer differs for women born in Haiti compared to those born in the United States and those born in other foreign countries.

Definition of Terms

Acculturation: "A process of accommodation with eventual (and irreversible) assimilation into the dominant culture group" (Thomson & Hoffman-Goetz, 2009, p. 983).

Benign: Not cancerous; does not spread to other parts of the body (U.S. National Library of Medicine, 2014).

Breast cancer: "Cancer that forms in tissues of the breast, usually the ducts (tubes that carry milk to the nipple) and lobules (glands that make milk)" (National Cancer Institute, n.d.a, para. 1).

Breast self-examination: A woman examining her breasts for any changes or abnormalities that may be an indication of cancer (American Cancer Society, 2014b)

Clinical breast examination: An examination of a woman's breasts by a health professional (i.e., a doctor, a nurse, a physician assistant, etc.) (American Cancer Society, 2014).

Foreign born: Individual who had no U.S. citizenship at birth (Nwosu & Batalova, 2014).

Immigrant: A person who is born outside of the United States (Organisation for Economic Co-operation and Development, 2003).

Health disparities: Differences between groups of people. These differences can affect how frequently a disease affects a group, how many people get sick, or how often the disease causes death (U.S. National Library of Medicine, 2014).

In situ: Cancerous tumor that remains contained in the site where it started and has not spread to other parts of the body (U.S. National Library of Medicine, 2014).

Late stage breast cancer: Stages III and IV (American Cancer Society, 2014a).

Malignant/invasive: Cancerous; spreads to other tissues and organs of the body (U.S. National Library of Medicine, 2014).

Mammogram: An x-ray of the breast (National Cancer Institute, n.d.a).

Metastasis: The spread of cancer from its origin to other parts of the body (National Cancer Institute, n.d.c).

Nationality: A group of people who share the same history, traditions, and language, and who usually live together in a particular country (Nationality, n.d.).

Risk factor: A characteristic that increases a person's chance of developing an illness (World Health Organization, 2018).

Screening: Tests and exams to find breast cancer prior to the presence of symptoms (National Cancer Institute, n.d.e).

Staging: The severity or extent of cancer in an individual's body (National Cancer Institute, n.d.b).

Assumptions, Scope, Delimitations, and Limitations of the Study

As previously mentioned, the data source for this study was the SEER Program, which is based on population-based cancer registries across the United States (National Cancer Institute, n.d.d). The primary assumption I made in this study was that these participating registries were in compliance with the standardized reporting guidelines set by the National Comprehensive Cancer Network. This study was limited to all women receiving a primary diagnosis of breast cancer between 1973 and 2011. Among the limitations that I identified for this study was that SEER data represents only 28% of the U.S. population with an overrepresentation of foreign-born individuals (17.9% SEER vs. 12.8% United States) and minorities (see Table 1); factors that may have limited the generalizability of the outcomes of the study (Frankfort-Nachmias & Nachmias, 2008; National Cancer Institute, n.d.d).

Table 1

SEER Participants by Race and Hispanic Ethnicity as a Percentage of the U.S. Population

Race/ethnicity	Total SEER	SEER % of U.S. population	Total U.S.	% of total U.S. population
White	55,638,167	24.9	223,553,265	72.4
Black	9,975,844	25.6	38,929,319	12.6
American Indian/ Alaska Native	1,284,768	43.8	2,932,248	0.9
Asian	7,390,717	50.4	14,674,252	4.8
Native Hawaiian/ Pacific Islander	358,915	66.5	540,013	0.2
Other Race	8,352,748	43.7	19,107,368	6.2
Two or More Races	3,354,326	37.2	9,009,073	2.9
Hispanic	19,366,596	38.4	50,477,594	16.3

Note. $N = 308,745,538$.

Another weakness was that there may have been other variables beyond those assessed by SEER, such as lifestyle behaviors or obesity status, that may explain the relationship between the outcome and predictor variables (Frankfort-Nachmias & Nachmias, 2008). In addition, Frankfort-Nachmias and Nachmias (2008) argued "because researchers often cannot manipulate the independent variable, the direction of causation must be logically or theoretically inferred" (p. 133). Finally, self-reported data lends itself to recall bias, which may have minimized the accuracy of the results (see Szklo & Nieto, 2014).

Significance

Second to skin cancer, breast cancer is the most common cancer among American women (American Cancer Society, 2013b). It is also the second leading cause of cancer deaths in this group (American Cancer Society, 2013b). While this disease is without a cure, detecting it at an early stage can improve a woman's health outcomes (American

Cancer Society, 2013b). To that end, many initiatives have sought to increase awareness of breast cancer, minimize its risks, and improve its early detection. One such example is the CDC's National Breast and Cervical Cancer Early Detection Program. This effort provides screening and diagnostic services to eligible women of underserved communities across the United States, and in 2014 alone, it diagnosed 4,325 breast cancers in the 242,534 women screened (CDC, 2016). While such statistics are encouraging, the persisting disparities observed relative to race/ethnicity and socioeconomic status give cause for concern and indicate that more work needs to be done. In this study, I sought to shed light on the issue from a different perspective. As previously mentioned, disease patterns relative to race/ethnicity have been explored extensively; however, variation within this variable as it pertains to nationality is less understood.

The results of this study contribute to literature by filling a gap in knowledge and laying the groundwork for future research that would aim to understand how nationality impacts a person's decisions about health, which in turn affects their health outcomes. Furthermore, the findings of this study serve as an impetus for improving the health of Haitian women who are currently and may one day be impacted by breast cancer. Early detection is key in improving its outcome, thus the potential implications for social change of the study include an increase in awareness of breast cancer risk among Haitian women as well as an increase in knowledge that might inform interventions aimed at improving screening behaviors in this group and other underserved populations. The

long-term goal is to empower women such that they take ownership of their health and make health-conscious decisions that ultimately improve their lives.

Summary

In Chapter 1, I introduced the study by briefly discussing its purpose, the gap in literature it will address as well as the questions and hypotheses to be explored. In addition, I introduced the theory on which this study was based, the nature of the study, its scope, limitations, and explained why it is significant. In Chapter 2, I will summarize current literature that lays the groundwork for exploring late-stage breast cancer diagnosis among Haitian women and substantiates the notion that late-stage diagnosis is impacted by demographic variables, socioeconomic status, and immigration status.

Chapter 2: Literature Review

Introduction

A wealth of evidence, including studies conducted by the American Cancer Society and the National Institutes of Health, supports the presence of health disparities in breast cancer. Although Black women have a lower breast cancer incidence than their White counterparts, their age-adjusted mortality rate is significantly higher (CDC, 2010). Furthermore, the rate of late-stage diagnosis is higher among Black women (CDC, 2010). Patterns within the Black race, however, are not well understood. To assume homogeneity within this group may not be accurate because doing so does not take into consideration the varying cultural, social, and life course exposures and experiences (Borrell, Castor, Conway & Terry, 2006). With this study, I aimed to examine breast cancer incidence and risk among Caribbean immigrants, specifically comparing Haitian women with U.S.-born and foreign-born populations in the United States.

This chapter will begin with the strategy that I used to search the literature and will proceed with a discussion of the theoretical basis for this research. Then, I will provide an exhaustive review of the current literature related to breast cancer and race, with a special emphasis on the disease as experienced by various ethnicities within the Black race in the United States. The chapter will end with concluding remarks.

Literature Search Methods

The databases that I accessed to conduct this literature review were: Academic Search Complete (EBSCOhost), ProQuest, Medline, CINAHL Plus, Science Direct, and PubMed. My search was limited to seminal and current peer-reviewed sources published

between 1991 and 2015. I used the following keywords in the search, alone and in combination: *breast cancer, breast carcinoma, stage, late-stage diagnosis, trends, epidemiology, morbidity, mortality, socioeconomic status, social determinants, disparities, risk factors, genetics, race/ethnicity, Haitian women, Caribbean women,* and *screening*.

Theoretical Framework

One of the key contributors to the disparities observed in breast cancer is late-stage diagnosis. Screening assists in early detection and improves survival outcomes (American Cancer Society, 2013b). Pasick and Burke (2008) asserted that the disparities result from access barriers and limited promotion of mammograms in underserved communities. As such, the theoretical framework on which this study was based assesses how health behavior can be modified to promote screening. As I mentioned in Chapter 1, this study was based on the socio-ecological model, which suggests that behavior is impacted by multiple levels of influence and that there is a reciprocal causation between the individual and the social environment (Hiatt & Breen, 2008; Simons-Morton et al., 2012). The seven levels of this model, as defined by Simons-Morton et al. (2012), are intrapersonal, interpersonal, organizational, community, public policy, physical environment, and culture.

Daley et al. (2011) evaluated barriers to cervical cancer screening and treatment in Florida through the lens of the socio-ecological framework. Through qualitative means, including semi structured interviews of health professionals in communities with higher than average cervical cancer incidence and mortality rates, the authors discovered

barriers across four levels of the model. At the policy level, they found that state budget cuts resulted in less funding for screening programs and to assist in paying for necessary follow-up testing. Not qualifying for public insurance due to undocumented status or financial constraints were also cited as important policy level barriers in their study. Several community level barriers were reported such as cultural differences, difficulty obtaining transportation, and the fear of deportation (Daley et al., 2011). At the institutional level were a lack of certain medical services in some areas (i.e., colposcopy) as well as a lack of physicians to provide referrals, screening, diagnostic, and treatment services. Finally, factors that served as barriers to screening at the individual level were the fear of being tested, personal behaviors of missing appointments or refusing treatment, poverty-related stressors, and a lack of education (Daley et al., 2011). Addressing factors or barriers from the different levels of the socio-ecological theory can assist in improving a woman's screening behaviors, which can in turn influence the stage at which breast cancer is diagnosed.

What is Breast Cancer?

Breast cancer refers to the formation of cancerous cells in the tissues of the breast, primarily the ducts and lobules (National Cancer Institute, n.d.a). The cells may develop into a lump also called a tumor, which can metastasize to other regions in the body (National Cancer Institute, n.d.a). One of the ways that breast cancer spreads to other parts of the body is via the lymph system, a part of the immune system whose role is to fight infections (National Cancer Institute, n.d.a). This system carries a clear fluid called lymph, nutrients, and white blood cells (i.e., cells that fight disease), which are drained

into lymph nodes ((National Cancer Institute, n.d.a; see Figure 1). Lymph nodes are clusters of bean-shaped tissues that contain disease-fighting cells and serve as a filter for harmful substances by moving abnormal cells away from healthy tissue (National Cancer Institute, n.d.a).

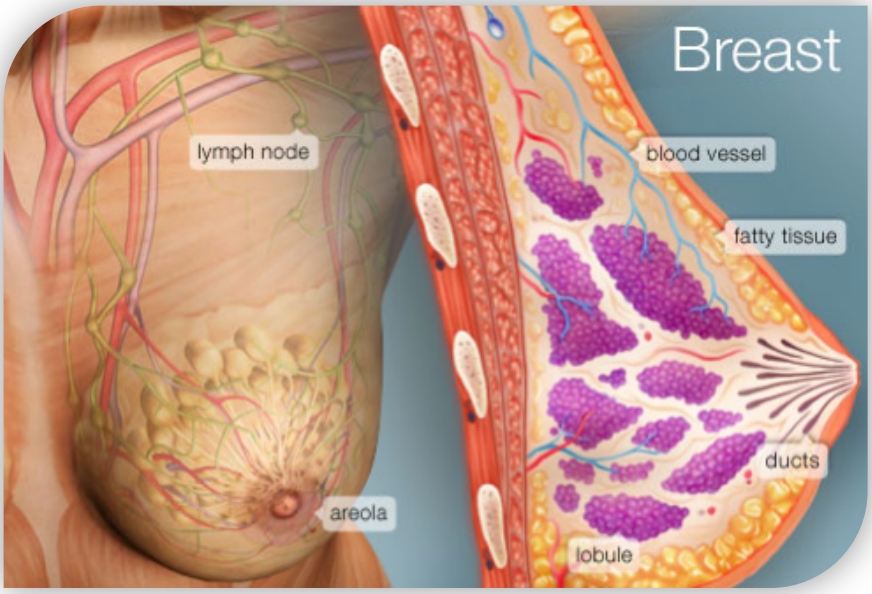

Figure 1. Anatomy of a normal breast. Reprinted from "Women's Health," by WebMD, Corporation, 2012. Retrieved from https://www.webmd.com/breast-cancer/breast-cancer-normal-breast. Copyright 2001 by WebMD Corporation. Source is public domain, no permission required.

Breast Cancer Types

Breast cancers are divided into two main categories: sarcomas and carcinomas (American Cancer Society, 2013b). Sarcomas, which begin in connective tissues, are rare forms of breast cancer, accounting for less than 1% of incident cases (American Cancer Society, 2013b). Carcinoma is the most common breast cancer and is my focus in this section. Carcinomas are cancers that develop in the lining of an organ; ductal carcinoma

and lobular carcinoma are the two that affect the breast (American Cancer Society, 2013b). Ductal carcinoma in situ is confined to the cells that line the ducts of the breast (see Figure 1; American Cancer Society, 2013b). This noninvasive form of cancer accounts for 85% of new in situ cases and can be cured when caught early enough (American Cancer Society, 2013b; Linton, 2013). When ductal carcinoma metastasizes beyond the ducts, it is referred to as invasive or infiltrating ductal carcinoma (American Cancer Society, 2013b). According to the American Cancer Society (2013b), 8 of 10 invasive cancers are invasive ductal carcinomas.

Lobular carcinoma in situ, also called lobular neoplasia, is a noninvasive carcinoma that begins in the lobules of the breast (American Cancer Society, 2013b). This type of cancer rarely metastasizes when left untreated (American Cancer Society, 2013b). Invasive lobular carcinoma also begins in the lobules, and about 1 in 10 breast cancers falls under this category (American Cancer Society, 2013b). Another uncommon type of breast cancer is inflammatory breast cancer, accounting for 1% to 5% of all breast cancers in the United States (American Cancer Society, 2013b). Although this invasive cancer spreads quickly, it does not take the shape of a tumor but is instead characterized by red, thick, and pitted skin that is warm to the touch and swollen (American Cancer Society, 2013b). Because of this, it tends to be more difficult to detect with a screening mammogram (American Cancer Society, 2013b). In addition, inflammatory breast cancer is generally diagnosed at Stage III or IV (National Cancer Institute, 2012b).

Staging

Once a diagnosis of breast cancer is given, the stage of the cancer must be established in order to determine the appropriate course of treatment (American Cancer Society, 2013b). Staging describes the spread of the disease in the body and is based on tumor size, lymph node involvement, and whether it is present in other organs (American Cancer Society, 2013b). The most common standardized system used to classify breast cancer is the American Joint Committee on Cancer TNM system. Breast cancer stages range from 0 (noninvasive) to IV (invasive) and are classified based on *T* (tumor size), *N* (lymph node involvement), and *M* (metastasis of the tumor; see Table 2). The TNM system is more commonly used in clinical settings (American Cancer Society, 2013b).

The SEER Summary Stage system is a simplified staging system based on five stages: in situ, localized, regionalized, distant, and unknown (see Table 2; American Cancer Society, 2013b). In situ, a localized cancer is confined to the organ of origin, while regional stage refers to cancers that have metastasized to surrounding tissues or nearby lymph nodes (American Cancer Society, 2013b). Distant stage corresponds to cancers that have spread to distant organs or lymph nodes above the collar bone (American Cancer Society, 2013b). This system is more common in public health research and planning as well as reporting cancer registry data (American Cancer Society, 2013b).

Table 2

TNM and SEER Staging Guidelines, 2013

Stage	T (Tumor Size)	N (Lymph Node Involvement)	M (Metastasis)	SEER Stage
Stage 0	Tis: Carcinoma in situ	N0: Cancer has not spread to nearby lymph nodes	M0: No distant spread	Local
Stage IA	T1: 2 cm or less across	N0: Cancer has not spread to nearby lymph nodes	M0: No distant spread	Local
Stage IB	T0: No evidence of primary tumor OR T1: 2 cm or less across	N1mi: Cancer spread in 1 to 3 lymph nodes under the arm (2mm or less across)	M0: No distant spread	Regional
Stage IIA	T0: No evidence of primary tumor OR T1: 2cm or less across	N1: Cancer has spread to 1 to 3 axillary lymph nodes and/or tiny amounts of cancer in internal mammary lymph nodes	M0: No distant spread	Regional
	T2: More than 2cm to 5cm across	N0: Cancer has not spread to nearby lymph nodes	M0: No distant spread	Local
Stage IIB	T2: More than 2cm to 5cm across	N1: Cancer has spread to 1 to 3 axillary lymph nodes and/or tiny amounts of cancer in internal mammary lymph nodes	M0: No distant spread	Regional
	T3: More than 5cm across	N0: Cancer has not spread to nearby lymph nodes	M0: No distant spread	Local
Stage IIIA	T0: No evidence of primary tumor; T1: 2cm or less across or T2: More than 2cm to 5cm across	N2: Cancer has spread to 4 to 9 axillary lymph nodes or cancer has enlarged the internal mammary lymph nodes	M0: No distant spread	Regional
	T3: More than 5cm across	N1: Cancer has spread to 1 to 3 axillary lymph nodes and/or tiny amounts of cancer in internal mammary lymph nodes OR N2: Cancer has spread to 4 to 9 axillary lymph nodes or cancer has enlarged the internal mammary lymph nodes	M0: No distant spread	Regional
Stage IIIB	T4: Tumor of any size growing into the chest wall or skin	N0, N1, or N2: Cancer may or may not have spread to a maximum of 9 axillary nearby lymph	M0: No distant spread	Regional
Stage IIIC	Any T: Any size tumor	N3: Cancer has spread to 10 or more axillary lymph nodes, to the lymph nodes under or over the clavicle, or involves the axillary lymph nodes and has enlarged the internal mammary lymph nodes	M0: No distant spread	Distant
Stage IV	Any T: Any size tumor	Any N: Cancer may or may not have spread to nearby lymph nodes	M1: Distant spread	Distant

Note. Adapted from "Breast cancer overview," by American Cancer Society, 2013b. Retrieved from http://www.cancer.org/Cancer/BreastCancer/OverviewGuide/breast-cancer-overview-prevention. Adapted from "Cancer staging," by National Cancer Institute, ndb. Retrieved from http://www.cancer.gov/cancertopics/factsheet/detection/staging. Sources are public domain, permission not required to reproduce.

Descriptive Epidemiology of Breast Cancer

Overall Trends

A collaborative annual report from the American Cancer Society, the National Cancer Institute, the North American Association of Central Cancer Registries, and the CDC suggested varying breast cancer trends in age-adjusted incidence and mortality since 1975 (Edwards et al., 2010). Incidence rates from 1975 to 1980 were constant, while 1980 to 1987 marked an annual 4% increase (Edwards et al., 2010). Between 1987 and 1994, incidence rates were stable followed by an upward trend of 1.6% annually from 1994 to 1999 (Edwards et al., 2010). Statistically significant declines in incidence began during the period of 1999–2004 with annual percent changes of 2.2% and have since remained stable through 2010 (Edwards et al., 2014). Breast cancer death rate trends also varied. An upward annual percent change of 0.4 was observed from 1975 to 1990; however, consistent improvements in these mortality rates have been observed since (Edwards et al., 2014). More specifically annual percentage decreases of 1.8%, 3.2% and 1.9% were noted for 1990–1995, 1995–1998 and 1998–2010, respectively (Edwards et al., 2014).

Both incidence and death rates fluctuated differentially by race. White and Black women experienced similar increases in yearly incidence of about 4% from 1980 to 1987 and from 1979 to 1986, respectively (Howe et al., 2001). From 1987 to 1998, while incidence rates remained stable for White women, that among Blacks increased by 0.9% annually (Howe et al., 2001). A decline in incidence was observed among all races and

ethnic groups from 1997 to 2006 (Edwards et al, 2010). These rates continued to stabilize for all races and ethnicities from 2001 to 2010 but on average increased by 0.5% per year for Black women (Edwards et al., 2014). Several factors influence the changes noted in incidence rates.

In reviewing mortality trends relative to race/ethnicity, Howe et al. (2001) reported average yearly increases of 0.2% for Whites from 1973 to 1990 and 1.3% for Blacks. From 2001 to 2010, death rates for all racial and ethnic groups were on the decline with the exception of American Indian/Alaska Natives who were stable (Edwards et al., 2014). Regarding survival, the 5-year survival rate for 2004 to 2010 was 89.2% (Edwards et al., 2014). Stage at diagnosis can impact a person's survival rate. The National Cancer Institute (n.d.a) reported a 98.5% 5-year survival rate for localized cancers, 84.6% for regional cancers, and 25% for distant cancers. Relative to race, White women have a 90.4% 5-year survival rate compared to 78.7% for Black women (National Cancer Institute, n.d.b).

New Breast Cancer Cases

Age.

According to the National Cancer Institute (n.d.), there was an estimated 232,670 new breast cancer cases in 2014 and 40,000 women did not survive. From 2007-2011, the yearly age-adjusted incidence rate of this illness was 124.6 per 100,000 women compared to 123.8 per 100,000 women between 2006 and 2010 (National Cancer Institute, n.d.b). Breast cancer is rare among women under the age of 35 years and new cases markedly increase with age at 45 years (see Figure 2). The median age at diagnosis is 61 years;

with most cases diagnosed in the 55 to 64 years age group (see Figure 2). In terms of mortality, the National Cancer Institute (n.d.b) indicated that the overall age-adjusted death rate for all women is 22.2 per 100,000. Women diagnosed at an older age have a higher mortality rate than those diagnosed at a younger age; with higher death rates in women aged 55 and over (see Figure 2).

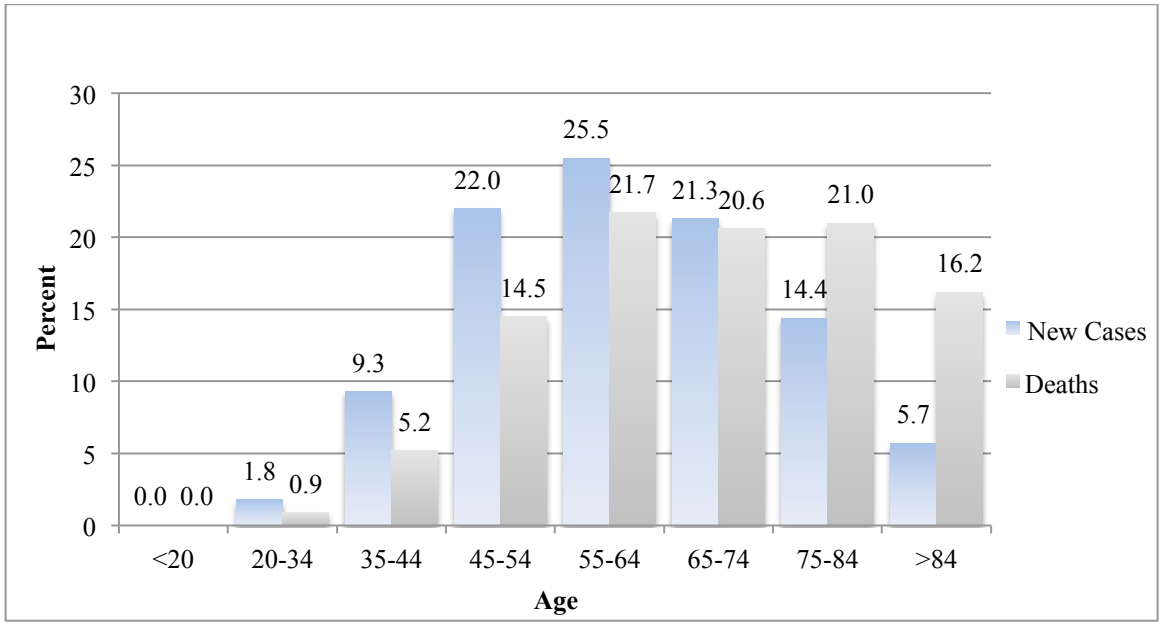

Figure 2. New breast cancer cases and mortality by age group. Adapted from "Cancer Staging," by the National Cancer Institute, n.d.b. Retrieved from http://www.cancer.gov/cancertopics/factsheet/detection/staging

Race and ethnicity.

White women have the highest incidence rate compared to other races at 128 per 100,000. The National Cancer Institute (n.d.b) reported that second to whites in incidence are blacks (122.8 per 100,000) followed by Asian/Pacific Islanders (93.6 per 100,000), with the lowest rate observed among American Indian/Alaska Natives (79.3 per 100,000), (National Cancer Institute, n.d.b). Black women have the highest mortality rate (30.6 per

100,000) while the lowest death rate is among Asian/Pacific Islander women at 11.3 per 100,000. These rates are summarized in Table 3.

Table 3

2006-2010 Age-Adjusted Incidence and Death Rates by Race

Race/ethnicity	Incidence per 100,000	Death rate per 100,000
All Races	124.6	22.2
White	128.0	21.7
Black	122.8	30.6
Asian/Pacific Islander	93.6	11.3
American Indian/Alaska Native	79.3	15.2
Hispanic	91.3	14.5

Note. Adapted from "Cancer Staging," by the National Cancer Institute, n.d.b. Retrieved from http://www.cancer.gov/cancertopics/factsheet/detection/staging

In evaluating the trend of this disease relative to race and ethnicity, the CDC (2010) reported that from 1997 to 2007 White women had the highest yearly incidence of breast cancer followed by African American women; however, the converse was true for mortality rates. Although African Americans have a lower incidence than White women, their age-adjusted mortality rates are considerably higher; this same pattern is also evident in their survival rates (CDC, 2010; Newman, 2005). In fact, the American Cancer Society (2013c) asserted that breast cancer death rates are 41% higher among Black/African American women compared to their White counterparts. These sources provide strong evidence for the presence of health disparities as they relate to race/ethnicity; however, race and ethnicity may not be the only factors affecting these differences.

Breast Cancer Risk Factors

The factors that increase the risk for developing breast cancer can be categorized as either non modifiable or modifiable. Non modifiable breast cancer risk factors are those that cannot be controlled and mainly include age, sex, race/ethnicity, family history, and a person's genes. Being a woman increases the likelihood of developing breast cancer as does increasing age. Breast cancer diagnosis over the next 10 years for women in their 30s is about 0.44% or 1 in 227, for those in their 40s it is 1.47% or 1 in 68, at 50 years it is 2.38% or 1 in 42, in the 60s the risk increases to 3.56% or 1 in 28 and to 3.82% or 1 in 26 for women in their 70s (National Cancer Institute, 2012).

Genetic factors play a key role in the development of breast cancer. The growth of tumors in the breast is a result of an accumulation of mutations in genes that are responsible for cell growth and division or repairing DNA that are damaged (Shuen & Foulkes, 2011). Inherited genetic mutations increase breast cancer risk by 20% to 25% (Nickels et al., 2013). The more common genes, BRCA1 and BRCA2, which perform the function of producing tumor suppressor proteins that assist in repairing DNA, are estimated to account for 40% of familial breast cancer. Chen and Parmigiani (2007) conducted a meta-analysis of 10 studies to determine the average cumulative breast cancer risk at 70 years for women who carry BRCA1 and BRCA2 mutations. Findings suggest a risk of 57% (95%CI: 47%, 66%) for BRCA1 mutation carriers and 49% (95% CI: 40%, 57%) for BRCA2 mutation carriers. Studies have also identified breast cancer linkages with several other genes including ATM, TP53, CHEK2, PALB2, PTEN, BRIP1, CDH1, RAD50, and STK11 (American Cancer Society, 2012; Nickels et al.,

2013; Shuen & Foulkes, 2011; Walsh & King, 2007). Regarding race/ethnicity and their relationship with genetic risk, Ashkenazi Jews have an increased risk of carrying mutations in BRCA1 and BRCA2 (Shuen & Foulkes, 2011).

Other non modifiable risks include long-term use of hormone-replacement therapy, starting menstruation before the age of 12 years and going through menopause after 55 years (CDC, 2013). Early menstruation and late menopause increase the risk of developing breast cancer due to a longer exposure to estrogen, which also plays a role in breast cancer diagnosis (Breastcancer.org, 2012; National Cancer Institute, 2012). Pregnancy and breastfeeding have been found to decrease the risk by reducing the overall number of menstrual cycles and thus the exposure to estrogen (Breastcancer.org, 2012).

Modifiable factors can be changed through lifestyle and health habits. According to Boyles (2009), an estimated 40% of breast cancer cases in the United States could be prevented by modifying these lifestyle measures. The American Cancer Society (2013a) and the CDC (2013) associated the following modifiable risk factors with breast cancer: being overweight or obese, physical inactivity, poor diet, smoking, and alcohol consumption. Nickels et al. (2013) conducted a study to assess the gene-environment interactions for breast cancer. More specifically, they aimed to determine if the effect of breast cancer genetic variants can be modified by lifestyle risk factors, referred to as environmental factors in the article. These factors include body mass index (BMI), alcohol consumption, physical activity, cigarette smoking, and parity. Results of the study support such gene-environment interactions concluding that genetic variants are

modified by high alcohol consumption, reproductive factors, and the number of births a woman has (Nickels et al., 2013).

Weight Status

The effect of BMI on breast cancer varies by menopausal status. Among premenopausal women, an increase in BMI does not increase the risk of developing breast cancer (John, Sangaramoorthy, Phipps, Koo, & Horn-Ross, 2011; Rose & Vona-Davis, 2010) whereas the reverse is true among postmenopausal women (Eliassen, Colditz, Rosner, Willett, & Hankinson, 2006; Reeves et al., 2007). As an example, Amadou et al. (2013) conducted a systematic review and a dose-response meta-analysis including 30 studies (19 case-controls and 11 cohorts) published between 2000 and 2010 associating obesity with premenopausal breast cancer. Different anthropometric measures were assessed- BMI, waist to hip ratio, height, waist circumference, weight, and hip circumference. Results suggest an inverse relationship between BMI and premenopausal breast cancer (*RR*: 0.95, 95% CI: 0.94, 0.97; $p < 0.001$). When race and ethnicity were factored into the analysis, the inverse relationship remained true for Africans and Caucasians while a positive association was observed for Asian women (*RR* = 1.05, 95% CI: 1.01, 1.09; $p = 0.006$).

In terms of waist to hip ratio, Amadou et al. (2013) report a positive relationship between this measure and premenopausal breast cancer risk with a dose-response *RR* of 1.08 (95% CI: 1.01, 1.16; $p < 0.001$) for every 0.1 unit increase. Positive associations were also observed for the three racial/ethnic groups. There was also an overall positive association between height (10cm increase) and breast cancer risk among premenopausal

women (*RR* = 1.03, 95% CI: 1.02, 1.05; $p < 0.001$). The authors did not observe a statistically significant relationship between the other anthropometric measures (weight, hip circumference, and waist circumference) and premenopausal breast cancer risk (Amadou et al., 2013).

Research conducted by Nimptsch and Pischon (2015) supported the presence of a positive association between postmenopausal breast cancer risk and obesity. They cite two meta-analyses in their review. Results from the first was based on 15 cohort studies and 35 case-control studies and indicated that "compared with normal-weight women (BMI 18.5–24.9 kg/m2), women who were overweight (BMI 25–29.9 kg/m^2) had an 8% higher risk of postmenopausal breast cancer (*RR*: 1.08, 95% CI: 1.00, 1.17), while obese (BMI ≥ 30 kg/m2) women had a 21% higher risk (*RR*: 1.21, 95% CI: 1.08, 1.34)" (Nimptsch & Pischon, 2015, p. 42). The second meta-analysis included 30 prospective studies and found a 12% increase in breast cancer risk among postmenopausal women with every 5kg/m^2 increment increase in BMI (Nimptsch & Pischon, 2015).

Smoking

A growing body of evidence links cigarette smoking with an increased risk of breast cancer. Gaudet et al. (2013) explored this relationship by evaluating data from the American Cancer Society's Cancer Prevention Study II Nutrition Cohort (CPS-II) as well as by conducting a meta-analysis of 14 cohort studies. Hazards ratios (HR) were reported in the findings. Based on the analysis of 3,721 invasive breast cancer cases in CPS-II, Gaudet et al. found that current smokers and former smokers had a higher incidence than those reporting that they never smoked (*HR* = 1.24, 95% CI: 1.07, 1.42 and *HR* = 1.13,

95% CI: 1.06, 1.21, respectively). Furthermore, women who started smoking before menarche or who smoked more than 10 years before the birth of their first child had a higher risk of breast cancer. Results from the meta-analysis suggest a weaker relationship between breast cancer risk and current smoking (*HR* = 1.12, 95% CI: 1.08, 1.16) or former smoking (*HR* = 1.09, 95% CI = 1.04, 1.15).

A prospective study with a sample of African-American women yielded positive associations as well. Using a sample of 1,377 breast cancer cases from the Black Women's Health Study followed for 14 years, Rosenberg et al. (2013) found that active smoking that started before 18 years of age increased the risk of premenopausal breast cancer with an incidence rate ratio (IRR) of 1.70 (95% CI: 1.05, 2.75). Additionally, passive smoking increased the breast cancer risk for premenopausal women with an *IRR* of 1.42 (95% CI: 1.09, 1.85). No relationship was noted between postmenopausal breast cancer and smoking (Rosenberg et al., 2013).

Alcohol Consumption

The consumption of alcohol increases the risk of developing breast cancer. A study conducted by Allen et al. (2009) aimed to investigate the link between breast cancer risk and moderate alcohol consumption, defined as three alcoholic beverages (30 grams) or less per day. Through a prospective cohort study design, a sample of 1.3 million middle-aged women enrolled in the United Kingdom's Million Women Study were asked questions about their lifestyle behaviors and were followed for an average of 7.2 years. As is demonstrated in Table 4, Allen et al. (2009) found a positive relationship between alcohol consumption and breast cancer risk after controlling for demographic,

socioeconomic, and behavioral factors. More specifically, their findings suggest that an increase of 10 grams per day increased the risk of breast cancer by 12% (95% CI: 9%. 14%).

Table 4

Relative Risk of Breast Cancer by Alcohol Intake

Amount of alcohol consumed	*n*	*RR* (95% CI)
All women	28,380	-
Nondrinkers	6,409	1.00 (0.97, 1.03)
≤ 2 drinks per week	7,841	1.00 (0.98, 1.02)
3 – 6 drinks per week	6,642	1.08 (1.05, 1.10)
7-14 drinks per week	5,672	1.13 (1.10, 1.16)
≥ 15 drinks per week	1,816	1.29 (1.23, 1.35)

Note. Adapted from "Moderate alcohol intake and cancer incidence in women" by N. E. Allen, et al., 2009, *JNCI: Journal of the National Cancer Institute, 101*(5), p. 300.

Advanced Stage Breast Cancer and its Risks

There are several important factors to consider when examining late-stage breast cancer, two of which are its risk factors and the role of screening for early detection. According to Ik Cho et al. (2011), the risk of developing breast cancer at a late stage increases with the presence of risk factors including low socioeconomic status, low educational attainment, being of a racial or ethnic minority group, and the status of being an immigrant or born in a foreign country. A study conducted by Mandelblatt, Andrews, Zauber, and Burnett (1991) sought to examine the impact of race, socioeconomic status, and health care setting on breast cancer stage. Results were based on data from the 1980-1985 New York State Department of Health Tumor Registry. Due to limited data, the races assessed included black or White, marital status was categorized as ever or never married and hospitals were dichotomized as public versus nonpublic. Median family

income and the percent of adults with a high school diploma from the 1980 U.S. Census were used as proxies for socioeconomic status. Findings suggest that late stage breast cancer diagnosis was significantly associated with black race, postmenopausal age, low educational attainment and the use of public hospitals (Mandelblatt et al., 1991).

Studies exploring the geographic location of primary health care settings and mammography facilities yield varying results. For example, Fahui, McLafferty, Escamilla, and Lan (2008) assessed the effect of these variables on late stage breast cancer diagnosis compared to the effect of socioeconomic and demographic characteristics on the same. Based on analyses of 31,914 incident breast cancer cases from the 1998 to 2000 Illinois State Cancer Registry, findings indicate that poor access to primary care settings increase the likelihood of breast cancer diagnosis at a late stage. Furthermore, there was a significant association between socioeconomic vulnerability and invasive breast cancer (Fahui et al., 2008).

Conversely, in addition to race/ethnicity, census tract poverty level and health insurance status, a more recent study aimed to assess whether increased travel time of 20 minutes or more to diagnosing facilities and mammography facilities were related to distant breast cancer stage (Henry et al., 2011). This study builds on previous research that suggested that women living in rural areas, inner-city neighborhoods, impoverished and racially segregated communities were at an increased risk of being diagnosed at a late stage (Amey, Miller, & Albrecht, 1997; Barry & Breen, 2005; Dai, 2010). Using a multi state sample of 161,619 women over the age of 40 years, authors found that while the geographic location of diagnosing and mammography facilities was not significantly

associated with invasive breast cancer diagnosis, the following factors were: being Hispanic or black, high poverty rates, and a lack of health insurance, age 40-49 years.

Late Stage Breast Cancer and Immigration

According to Anderson (2015), the proportion of black immigrants in the United States has grown considerably since 1980 and currently accounts for nearly 9% (3.8 million) of the Black population, an estimate that is anticipated to reach 16.5% by 2060. Figure 3 displays how the black foreign-born population has quadrupled since 1980. Half of these immigrants hail from the Caribbean. Haiti is the second source country of Black immigrants in the United States making up 15% of this group. With regards to the total U.S. foreign-born population, Haitians represent 1.5% of this group with the highest concentrations in Florida and New York (Nwosu & Batalova, 2014).

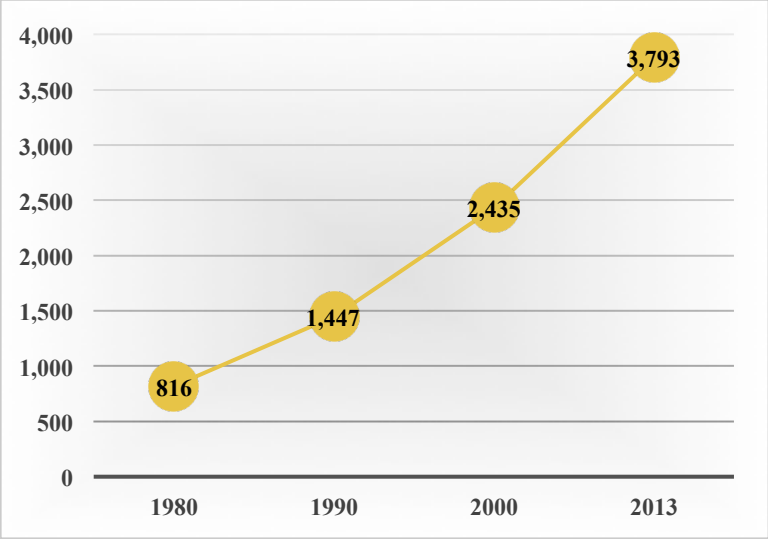

Figure 3. U.S. Black immigrant population in thousands. Adapted from "A rising share of the U.S. Black population is foreign born; 9 percent are immigrants; and while most are from the Caribbean, Africans drive recent growth," by M. Anderson, 2015, *Pew Research Center*. Retrieved from http://www.pewsocialtrends.org/2015/04/09/a-rising-share-of-the-u-s-black-population-is-foreign-born/

Very limited breast cancer data are available for the island of Haiti. The most recent study by Phillips et al. (2007) aimed to report on cancer incidence and mortality in eight Caribbean countries, Haiti included. Data were obtained from the International Agency for Research on Cancer's (IARC) CDROM database, GLOBOCAN. Results suggest that Haiti's incidence of breast cancer is among the lowest at 4.4 per 100,000 as is the mortality rate at 2.0 per 100,000 females (Phillips et al., 2007). The authors did not provide any information on stage at presentation.

These findings are inconsistent with the report asserting that in areas such as Miami, Florida, about 45% of breast cancer cases in the Haitian community are diagnosed at regional and distant stages (Kobetz et al., 2010). This suggests that "immigrants bring with them the patterns of disease that characterize the population of their country of origin but, over time, the immigrant groups or their progeny acquire a pattern more typical of their adopted country" (Phillips et al., 2007, p. 476).

Immigrants in the United States tend to report farer health outcomes compared to their U.S.-born counterparts. Improved self-rated health and mortality rates are just two measures for which this assertion holds true (Ik Cho et al., 2011). However, foreign-born women may have an increased likelihood of late stage breast cancer diagnosis. Some of the reasons cited for this disparity are social exclusion, limited English proficiency, a lack of health insurance, and limited knowledge of cancer prevention and screening practices (Chavez, McMullin, Mishra, & Hubbell, 2001; De Alba, Sweningson, Chandy, & Hubbell, 2004; Goel, et al., 2003; Ik Cho et al., 2011; O'Malley, Kerner, Johnson, Mandelblatt, 1999; Ramirez, Suarez, Laufman, Barroso, & Chalela, 2000).

Ik Cho et al. (2011) purposed to determine the relationship between neighborhoods with higher concentrations of immigrant populations and the risk of being diagnosed with distant breast cancer. The authors conducted analyses on a sample of 42,714 breast cancer cases obtained from cancer registry data from Cook County, Illinois. Cook County, Illinois is a leading port of entry for foreign-born individuals in the United States. Between 1990 and 2000, this county experienced a 67% increase in immigrants (717,300 to 1,064,700) with nearly half coming from Latin America (48.7%) followed by Europe (27.1%) and lastly Asia at 21.8% (Ik Cho et al., 2011). Two constructed indexes were assessed as independent variables in the analyses. The concentrated immigration index was composed of the percent of immigrants and the percent of households with one or more members speaking English proficiently (either well or very well). The second, concentrated disadvantage, was based on the percentage of families in a census tract below poverty level and the unemployment percentage of the census tract.

Findings suggest that an increase in the concentration of immigrant populations between 1990 and 2000 increased the risk of late stage breast cancer diagnosis for the women in these neighborhoods. More specifically, the odds of advanced stage breast cancer increased by 4% for every unit increase in the 1990 level of immigrant concentration of a census tract. When evaluating the change in immigrants between 1990 and 2000, each unit increase in a neighborhood's change increased the odds of distant breast cancer by 4%. In terms of concentrated disadvantage, each unit increase in this variable resulted in a 5% increase in the likelihood of late stage breast cancer diagnosis (Ik Cho et al., 2011).

Screening

Screening is another very important factor to consider in managing breast cancer. One of the main contributors to disparities in breast cancer is that Black/African American women and those in lower socioeconomic brackets are generally diagnosed at a later stage and with more aggressive forms of breast cancer (Newman, 2005; Byers, 2008; Vona-Davis, 2009). Following the guidelines for screening (breast self-exams, clinical breast examinations, and mammograms) increases the likelihood of diagnosing the disease at an earlier stage, thus improving health outcomes (American Cancer Society, 2013a).

Although many cases of breast cancer may not be preventable, early diagnosis can significantly increase the chances of a woman's survival. In terms of mammography, the recommended guideline is that women over the ages of 50 years get screened every 2 years (CDC, 2012a). Healthy People 2020 (2013) aimed to increase the proportion of women who receive mammograms to 81.1%. The current rate of breast cancer screenings in the United States is 77.8% among women aged 50 years and over (CDC, n.d.). Interestingly, racial and ethnic differences in screening rates are minimizing with 59% (range: 48%-72%) of White women 40 years and over and 64% (range: 49%-73%) of their African American counterparts reporting a mammogram in the last 2 years (DeSantis, Ma, Bryan, & Jemal, 2014). However, disparities in mortality rates from the disease persist, which may be an indication of differences in the quality of mammography and delays experienced in following up for abnormal screening results (DeSantis et al., 2014).

Figure 4 shows mammography trends in the United States by poverty status from 1987 to 2008 (DeSantis, Siegel, Bandi, & Jemal, 2011). Poverty status is defined based on the Federal Poverty Level (FPL). It is evident from this chart that income plays an important role in mammography screening where the proportion of individuals who follow the guidelines for mammography is lower among those living below FPL compared to those with higher income levels. Current research suggests that approximately 51.4% of individuals living below FPL obtain screening versus 72.8% in those with income greater than or equal to 200% FPL (DeSantis et al., 2011).

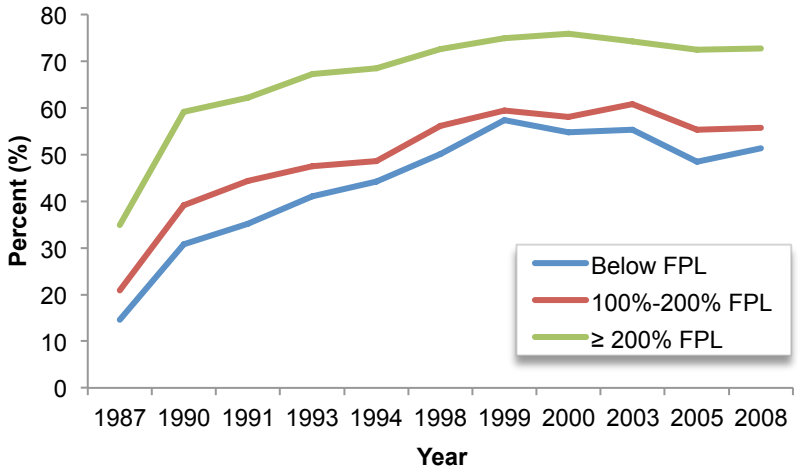

Figure 4. Trends in mammography screening by poverty status in the United States. Adapted from "Breast Cancer Statistics, 2011," by C. DeSantis, et al., 2011, *CA: A Cancer Journal for Clinicians, 61*(6), p. 415.

Summary

In Chapter 2, I summarized the current literature and data on breast cancer, late-stage breast cancer diagnosis and the varying risks that increase the likelihood of these outcomes. Great strides have been made in the United States to improve the early detection of breast cancer and increased screening is an integral part of that success. The

higher mortality rate of Black women as compared with their White counterparts, however, suggests that their breast cancers are being diagnosed at a later stage (Byers, 2008; Newman, 2005; Vona-Davis, 2009). Various barriers to cancer screening have been identified in the literature including cultural differences (Daley et al., 2011). Several studies have explored late-stage breast cancer diagnosis and its risks as they pertain to African American women but little is known on the Haitian experience with this health issue. The present study fills this gap in knowledge by exploring the relationship between nationality, late-stage breast cancer diagnosis and its risks. The ultimate goal of this research is to provide information that will serve as a foundation for successful breast cancer screening interventions. Chapter 3 will discuss the methodology of this study and will provide information on the following: research design, population, sampling procedures, data analysis plan, and ethical considerations.

Chapter 3: Research Method

Introduction

The purpose of this study was to assess late-stage breast cancer incidence and risk among Caribbean immigrants, specifically comparing Haitian women, Americans, and other immigrant populations in the United States. In this chapter, I will focus on the methodology used in this study. I will begin with an explanation of the research design, which will be followed by a discussion of the target population, the secondary dataset on which the analyses are based, and the data analysis plan. The chapter will conclude with a discussion of the ethical considerations and a summary.

Research Design and Rationale

The source of data for this study was the National Cancer Institute's 1973 to 2011 SEER Program. Therefore, the most appropriate research design for this study was the quantitative, retrospective cohort design, whereby the outcomes and exposures of a group of individuals are studied post hoc (see Szklo & Nieto, 2014). While the SEER program collects data on repeated measures of cancer incidence for participants over time, I only included the first occurrence of breast cancer in this study. Mann (2003) cited being low cost and quick to conduct as advantages of this type of research study, and the inability to collect data on all relevant variables that may impact effect as a disadvantage. This design assisted me in answering the research questions that in which I sought to examine racial/ethnic patterns of late-stage breast cancer risk relative to demographics, socioeconomic factors, and immigration status. The outcome variable of interest in this study was late-stage breast cancer diagnosis, dichotomously defined as Stages 0 to 3 and

Stage 4. The independent variable was nationality, which was based on birth country. The confounding variables that were controlled for included demographic factors (i.e., age and marital status), poverty level, and education, which served as proxies for socioeconomic status, health insurance status, acculturation as measured by language isolation, and breast cancer screening.

Methodology

As previously mentioned, as the data source for this study I used population-based cancer registries that are a part of the following 18 state and city-based cancer registries: San-Francisco-Oakland, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle-Puget Sound, Utah, Atlanta, San Jose-Monterey, Los Angeles, Alaska, rural Georgia, greater Georgia, greater California, Kentucky, Louisiana, and New Jersey (see Figure 5). Data reported in the SEER Program follow a rigorous quality improvement process such that the dataset is regarded as the standard for quality among cancer registries worldwide (National Cancer Institute, n.d.d). The dataset consists of 86,355,485 cases, which represents 27.8% of the U.S. population (National Cancer Institute, n.d.d). The following are the racial/ethnic breakdowns of the SEER participants: 64.4% White, 11.6% Black, 8.6% Asian, 1.5% American Indian/Alaska Native, 13.9% other, and 22.4% Hispanic. In terms of poverty level and educational attainment (i.e., individuals 25 years or more with less than a high school diploma), the SEER population is comparable to the United States (i.e., 14.1% vs. 14.3% and 16% vs 14.6%, respectively; National Cancer Institute, n.d.d). The immigrant population, however, is oversampled in the SEER database at 17.9% compared to 12.8% in the United States (National Cancer Institute, n.d.d). I included

cases in the analysis if they were diagnosed with breast cancer at 18 years of age or older and had a known place of birth. The total number of women who met the inclusion criteria was 608,625.

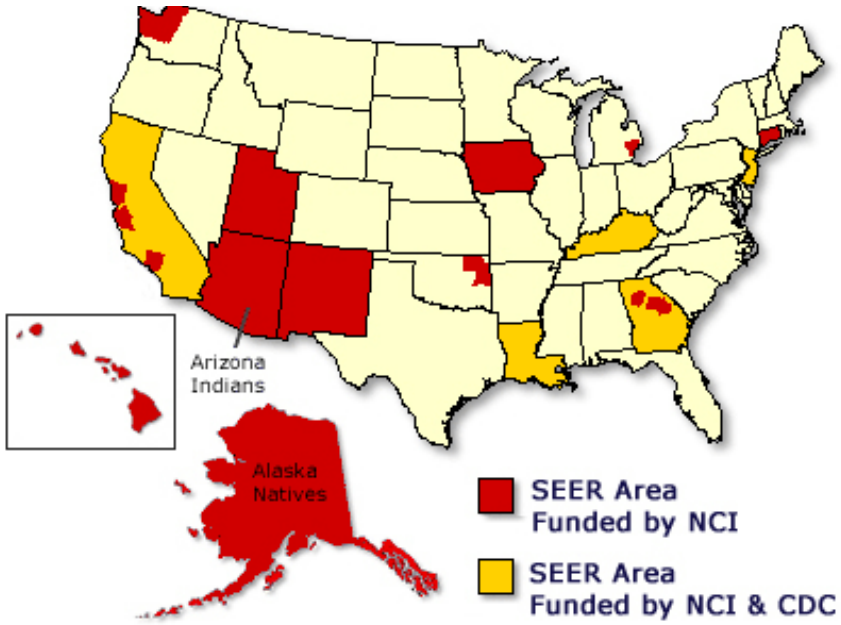

Figure 5. States participating in the SEER Program. Reprinted from "About the SEER Registries," by National Cancer Institute, n.d. Retrieved from https://seer.cancer.gov/registries/. Source is public domain, no permission required.

Variable Operationalization

With the first research question, I sought to examine the patterns that might exist based on nationality relative to late-stage breast cancer risk. The main outcome I used to assess late-stage breast cancer risk was the stage of breast cancer diagnosis. The stages for this ordinal variable are based on the description provided by the National Cancer Institute (2012) and are as follows: 0, IA, IB, IIA, IIB, IIIA, IIIB, IIIC, and IV. The lowest, Stage 0, indicates that the cancer is noninvasive, while the highest level of Stage

IV indicates that the cancer has spread to other parts of the body (National Cancer Institute, 2012). The primary independent variables were race and nationality. The nominal variable, race, provided in the SEER data included the following categories: White, Black or African American, American Indian and Alaska Native, Asian. For the purposes of this research, the ethnicities to be assessed are Hispanic/Latino and all others will be categorized as other. I identified Haitian women through the variable of birthplace. Nationality or foreign-born status were categorized as born in Haiti, born in the United States, and others not born in the United States or Haiti.

I considered the remaining variables as confounders because they may have affected the association between the outcome and independent variables. Age at diagnosis was an interval variable and was reported in years. The nominal variable, marital status (options: never married, married, separated, windowed, divorced, and other), was similar to the 2010 Census definitions. Educational attainment was characterized as continuous and includes the percentage of the population 25 years and older with less than a high school diploma. The percent of households in the participant's county living below poverty level and county-level median household income were used as proxies for income. The percent of unemployed, educational attainment, and poverty level were county attributes based on the U.S. Census (2000) American Community Survey 5-year data. Other county attributes included in the study were the percent of households with individuals 14 years and older who did not speak English as a measure of acculturation, and the percent of women aged 40 years and over who received a mammogram in the last 2 years. Health insurance coverage was a nominal variable, and its categories followed

the 2010 U.S. Census: employer based, direct purchase, TRICARE/military coverage, Medicare, Medicaid, Veterans Affairs health care, and no insurance. These variables were further categorized as insured and uninsured.

Data Analysis Plan

I developed the following research questions and their associated hypotheses to guide this:

Research Question 1: Is there a relationship between nationality and the likelihood of late-stage breast cancer?

$H_0$1: Haitian women are not more likely than other nationalities to be diagnosed with breast cancer at a late stage.

$H_1$1: Haitian women are more likely than other nationalities to be diagnosed with breast cancer at a late stage.

Research Question 2: What is the association between late-stage breast cancer diagnosis risk and demographics, socioeconomic factors, acculturation, health insurance status, screening, and nationality?

$H_0$2: There are no differences in the risk factors associated with late-stage breast cancer diagnosis relative to nationality.

$H_1$2: There are differences in the risk factors associated with late-stage breast cancer diagnosis relative to nationality.

I performed all statistical analyses using the IBM SPSS Version 24 software. The following descriptive statistics were provided for the variables of interest as appropriate: means, standard deviations, percentages, and sample sizes. The data analysis was divided

into two phases in congruence with the two research questions and sets of hypotheses to be tested. I calculated the relative risk of late-stage breast cancer diagnosis during the first phase to determine how the risk of late stage breast cancer compares by nationality. Subsequently, a logistic regression analysis was conducted to test the first hypothesis. With this statistical test, I ascertained the likelihood of late-stage diagnosis for Haitian born, foreign born, and U.S. born. To do so, the outcome variable stage of diagnosis was dichotomized such that a value of 0 (the reference category) equaled breast cancer Stages 0 through III while a value of 1 represented breast cancer cases diagnosed at Stage IV. This association was tested in the presence of and without the independent and confounding variables. As previously mentioned, the independent variable included in this analysis was nationality. The effect of demographic factors, health insurance status, socioeconomic variables, acculturation, and screening behaviors were controlled for in the analysis.

In the second phase of the analysis, I also made use of logistic regression to determine which factors (including all independent variables and confounders, except for race and nationality) were associated with an increased likelihood of reporting a late-stage diagnosis. A backward selection method was applied, and only the significant predictors were kept in the final model. Then, I used logistic regression models to assess the likelihood of reporting these risk factors given race/ethnicity and nationality. A backward selection method was also used to determine how the significant risk factors compare by nationality. Table 5 indicates the variables included in Phases 1 and 2 of the analysis. The associated odds ratios and 95% confidence intervals for all variables were

reported and a *p* value of .05 or less was used to indicate statistical significance in the results.

Table 5

Data Table for Analysis Phases 1 and 2

Variable Names	Categories
Late-stage diagnosis	0 = Stages 0 to IIIC (reference) 1 = Stage IV
Foreign-born status	1 = Born in Haiti 2 = Not Born in Haiti or the United States 3 = Born in the United States (reference)
Race	1 = Black/African American 2 = Asian/Pacific Islander 3 = American Indian/Alaska Native 4 = White (reference)
Ethnicity	1 = Non-Hispanic (reference) 2 = Hispanic
Age at diagnosis (in years)	N/A
Marital status	1 = Never married 2 = Separated 3 = Widowed 4 = Divorced 5 = Domestic partner 6 = Married (reference)
Poverty status	Percent Living below poverty
Insurance	1 = Insured (reference) 2 = Uninsured
Education	Percent with less than high school diploma
Employment status	Percent unemployed
Acculturation	Percent households with language isolation
Income	Median household income
Screening	Percent mammography in the last 2 years; 40 years and over

Note. N/A: Not Applicable

Threats to Validity

Frankfort-Nachmias and Nachmias (2008) described two types of validity: internal and external. Internal validity is compromised when "factors could invalidate the inference that the variables are causally related" (Frankfort-Nachmias & Nachmias, 2008, p. 95). On the other hand, external validity is the extent to which the results of a study can be generalized to other settings and to a larger population (Frankfort-Nachmias & Nachmias, 2008).

In this study, I made use of the secondary dataset, SEER. One of the advantages of this type of data is they provide a large sample size that covers a broad geographic region. This not only allows for the assessment of national trends but also allows for the generalizability of the results, thus increasing external validity (Carlson & Morrison, 2009). Although SEER data has an overrepresentation of foreign-born individuals, generalizability may be limited in this study because the Haitian population is primarily concentrated in Florida and New York, and these states are not included in SEER. The secondary nature of the SEER data also decreases internal validity because it limits the inferences that can be made due to the fact that data are not collected on all possible confounding or predictor variables (Carlson & Morrison, 2009). There may be additional factors correlated with Haitian nationality that could have biased the results of this study.

Ethical Procedures

In order to ensure that this research project was conducted ethically and that the rights of the participants were protected, the Walden University Institutional Review Board (IRB) reviewed and approved this study (approval number: 08-28-17-0232825).

The ultimate goal of the IRB is to assure that the benefits of a research project outweigh its risks for the participants, the researcher, copyright holders, the university, and potential stakeholders (Walden University, 2015). The use of a secondary dataset minimized any ethical issues that might have arisen with primary data. Although all patients in the SEER database have an identification number, it was not possible to determine who the participants were since the data are anonymous and de-identified. Therefore, the risk of potential harm to human subjects was highly improbable. SEER also requires all researchers to sign a Data-Use Agreement prior to releasing the dataset for public use. This agreement specifies the purpose for which the data are to be used and puts safeguards in place prohibiting the use of the data in the unlikely case that information is linked to a specific individual.

Summary

In Chapter 3, I detailed the methodological elements of this retrospective cohort study. I began with the research design and the rationale for the design, followed by the target population and the sample size of the study. I continued with a description of the SEER dataset, which included population characteristics. Following this was a discussion of the dependent and independent variables as well as the plan for data analysis. I closed the chapter with a discussion of threats to validity and ethical considerations. Chapter 4 will include the results of the analyses.

Chapter 4: Results

Introduction

The purpose of this retrospective cohort study was to assess late-stage breast cancer among women born in Haiti compared to those born in the United States and other foreign countries. With this study, I sought to answer the following research questions and their associated hypotheses:

Research Question 1: Is there a relationship between nationality and the likelihood of late-stage breast cancer?

$H_0$1: Haitian women are not more likely than other nationalities to be diagnosed with breast cancer at a late stage.

$H_1$1: Haitian women are more likely than other nationalities to be diagnosed with breast cancer at a late stage.

Research Question 2: What is the association between late-stage breast cancer diagnosis risk and demographics, socioeconomic factors, acculturation, health insurance status, screening, and nationality?

$H_0$2: There are no differences in the risk factors associated with late-stage breast cancer diagnosis relative to nationality.

$H_1$2: There are differences in the risk factors associated with late-stage breast cancer diagnosis relative to nationality.

I obtained the data for this study using the SEER*Stat program for all primary breast cancers reported from 1973 to 2011. In order to obtain the data for analysis, a case listing was created using the selection tab to define the parameters for the study

population. This case listing included females aged 18 years and over who had a primary diagnosis of breast cancer (CPT codes C50.0–C50.9) in all available years (1973 to 2011) and a known country of birth. These inclusion criteria resulted in 608,625 eligible cases for this study. I then exported the case listing into IBM (2016) SPSS Statistics 24 in order to complete the analysis.

SEER datasets do not include data on lifestyle variables such as weight status, exercise, smoking, or alcohol consumption. As a result, I did not control for these variables in the analysis, which was one of the limitations of this study. However, SEER provides data on county level attributes, which served as proxies for individual socioeconomic characteristics as well as screening behaviors. The county level variables I used in the analyses were percent with less than a high school diploma, percent of households with language isolation (i.e., households with individuals 14 years and older who did not speak English), percent of individuals living below the poverty level, median household income, percent unemployed, and percent of women aged 40 years and over who received a mammogram in the last 2 years.

This chapter will begin with the descriptive statistics of the variables included in the analyses. The I will discuss the results, providing the answers to the research questions. The chapter will conclude with a summary of the results.

Descriptive Statistics

The sample I used in the analysis consisted of 608,625 women over the age of 18 years who were diagnosed with breast cancer and had a known place of birth. Tables 6 and 7 provide the descriptive statistics of the categorical and numerical variables used in

the analysis, respectively. Nearly 9% of the cases were diagnosed at a later stage. An estimated 0.1% reported that they were born in the Haiti, 83.7% in the United States, and 16.2% in countries other than the United States or Haiti. In terms of race, the sample was predominately White with 83% of the women self-identifying as White, 9.5% as Black/African American, 6.9% as Asian/Pacific Islander, and the remaining 0.6% as American Indian/Alaska Native or other. The average age of the sample was 62.2 years. More than half of the sample was married at the time of diagnosis (52.5%) compared to 11.4% who were single. In addition, almost all the women were insured (99.3%). Of note was that 84.4% (n = 232,157) of women aged 65 years and over had either missing data for their insurance status or it was unknown. These cases were categorized as insured based on the assumption that individuals in this age group are eligible for Medicaid insurance (see Centers for Medicare & Medicaid Services, 2014).

Table 6

Descriptive Statistics of Categorical Variables Used in the Analysis (SEER, 1973–2011)

	Variable name	Categories	*N*	%
Breast cancer stage	Late-stage diagnosis	Stages 0 to IIIC (reference)	531,338	91.4
		Stage IV	50,157	8.6
Nationality	Foreign-born status	Born in the United States (reference)	509,648	83.7
		Born in Haiti	204	0.1
		Not born in the United States or Haiti	98,773	16.2
Demographic indicators	Race	White (reference)	504,699	83.0
		Black/African American	57,906	9.5
		Asian/Pacific Islander	42,157	6.9
		American Indian/Alaska Native	3,111	0.5
		Unknown	752	0.1
	Ethnicity	Non-Hispanic (reference)	561,435	92.2
		Hispanic	47,190	7.8
	Marital Status	Married (reference)	69,480	11.4
		Never married	319,313	52.4
		Separated	10,170	1.7
		Widowed	134,300	22.1
		Divorced	56,445	9.3
		Domestic partner	38	0
		Unknown	18,879	3.1
Health care utilization	Insurance	Insured (reference)	336,134	99.3
		Uninsured	2,491	0.7

As I previously mentioned, SEER does not provide socioeconomic information at the case level; however, these variables are assessed at the county level, so I used them as proxies for individual data. In terms of education, the mean percentage of individuals with less than a high school diploma was 14.3%. On average, 10% were unemployed, 14.2% lived below the FPL, and the county median household income was nearly $61,000. In addition, an average of 7% of households consisted of individuals aged 14 years and over who did not speak English. In terms of lifestyle factors, on average, 70.7% of women aged 40 years and older followed the recommended guideline of getting a mammogram in the last 2 years.

Table 7

Descriptive Statistics of Interval Variables Used in the Analysis (SEER, 1973–2011)

	Variable name	*M*	*SD*
Demographic indicator	Age at diagnosis (in years)	62.2	14.8
Socioeconomic indicators	Percent with less than high school diploma	14.3	5.9
	Percent unemployed	10.0	2.9
	Percent living below poverty	14.2	5.0
	Median household income	$60,606.4	$15,691.6
Acculturation	Percent households with language isolation	6.5	4.6
Screening	Percent mammography in the last 2 years; 40 years and over	70.7	5.4

Research Question 1

With the first research question, I assessed the relationship between nationality and the stage of breast cancer diagnosis (see Table 8). Approximately 9% of women born in the United States were diagnosed with breast cancer at a late stage compared to 11.2% of women born in Haiti and 7.7% of women born in other foreign countries. The relative risk of late-stage breast cancer diagnosis for Haitian women was 1.3 times (95% CI: 0.9, 1.9) that of women born in the United States and other countries.

Table 8

SEER Cases by Nationality and Breast Cancer Stage (1973–2011)

	Total	In Situ		Localized		Regional		Distant	
Place of Birth	*n*	*n*	%	*n*	%	*n*	%	*n*	%
U.S.	486,735	9,414	1.9%	27,1732	55.8%	16,2749	33.4%	42,840	8.8%
Haiti	196	2	1.0%	85	43.4%	87	44.4%	22	11.2%
Foreign	94,612	1,596	1.7%	52,178	55.1%	33,531	35.4%	7,307	7.7%
Total	581,543	11,012	1.9%	323,995	55.7%	196,367	33.8%	50,169	8.6%

Table 9 shows the results testing the first set of hypotheses for all women. The likelihood of late-stage breast cancer diagnosis was greater in Haitian women compared to women born in the United States and in other foreign countries (*OR* = 1.31; 95% CI: 0.84, 2.04 and *OR* = 1.51; 95% CI: 0.97, 2.36, respectively); these results are not statistically significant. On the other hand, women born in other countries were less likely than Americans to be diagnosed at Stage IV (*OR* = 0.87; 95% CI: 0.85, 0.89). With a *p* value of 0.232, I failed to reject the null hypothesis that Haitian women are not more likely than other nationalities to be diagnosed with breast cancer at a late stage.

Table 9

Association Between Late-Stage Breast Cancer and Nationality (SEER, 1973–2011)

Nationality	Odds Ratio (95% CI)	*p* value
U.S. born (reference)	1	
Haitian	1.31 (0.84, 2.04)	0.232
Foreign born	0.87 (0.85, 0.89)	0.000

Research Question 2

With the second research question, I sought to explore the association between late-stage breast cancer diagnosis risk and demographics, socioeconomic factors, screening behaviors, acculturation, and nationality. To answer this question, logistic regression was used to determine which factors (including all independent variables and confounders, except for race and nationality) were significantly associated with an increased likelihood of reporting a late-stage diagnosis. I used a backward selection method to remove the following variables: percent with less than a high school diploma, percent of individuals living below poverty, median household income, and percent of mammograms in the last 2 years among women age 40 and over. The remaining significant variables and their associated odds ratios are displayed in Table 10. A Hispanic ethnicity, being uninsured, and higher unemployment rates were significant predictors of late-stage breast cancer diagnosis (*OR* = 1.09, 2.78, and 1.02, respectively). On the other hand, an inverse relationship was observed between the outcome variable and the percent of households with language isolation (*OR* = 0.97) and marital status. More specifically for marital status, women reporting a marital status of never married, separated, widowed, and divorced were more likely than those stating they were married to be diagnosed with late-stage breast cancer (*OR* = 1.80, 1.67, 1.35, 1.47, respectively).

Table 10

Significant Predictors of Late-Stage Breast Cancer Diagnosis, Unadjusted for Race and Nationality (SEER, 1973–2011)

Predictors	*OR*	95% CI	*p* value
Ethnicity			
Non-Hispanic (reference)	1		
Hispanic	1.09	1.03, 1.14	0.001
Marital Status			
Married (reference)	1		
Never married	1.80	1.73, 1.87	0.000
Separated	1.67	1.54, 1.82	0.000
Divorced	1.47	1.40, 1.54	0.000
Widowed	1.35	1.31, 1.39	0.000
Domestic partner	1.11	0.34, 3.66	0.862
Insurance status			
Insured	1		
Uninsured	2.78	2.51, 3.07	0.000
Age at diagnosis	1.00	1.00, 1.00	0.000
Percent of unemployed	1.02	1.02, 1.02	0.000
Percent of households with language isolation	0.97	0.96, 0.97	0.000

In the next step of the analyses, I reintroduced nationality and race to the previous model containing the significant predictors of late-stage breast cancer diagnosis (see Table 11). With this final model, I assessed the likelihood of reporting these risk factors adjusting for race/ethnicity and nationality. The findings indicated that women born in Haiti were not more likely than those born in the United States to be diagnosed with breast cancer at a late-stage. However, there was a marginal statistical significance for an increased likelihood of the outcome in women born in other foreign countries compared to American women (*OR* = 1.04; *p* value = 0.045). In terms of race, Blacks/African Americans and Asians/Pacific Islanders were more likely than Whites to be diagnosed with breast cancer at Stage IV (*OR* = 1.58 and 1.27, respectively). The reverse was true

for American Indians/Alaska Natives (*OR* = 0.81). The positive association between late-stage breast cancer diagnosis and Hispanic ethnicity, not having health insurance, and higher rates of unemployment persisted with the inclusion of nationality and race in the model (*OR* = 1.12, 2.62, 1.01, respectively) as did a marital status of never being married, separated, divorced, and widowed (*OR* = 1.70, 1.60, 1.41, and 1.31, respectively). In addition, the inverse relationship between the outcome and language isolation also remained in the final model adjusting for race and nationality (*OR* = 0.97).

Table 11

Significant Predictors of Late-Stage Breast Cancer Diagnosis, Adjusted for Race and Nationality, (SEER, 1973–2011)

Predictors	*OR*	95% CI	*p* value
Nationality			
U.S. born (reference)	1		
Haitian	0.68	0.36, 1.29	0.240
Foreign Born	1.04	1.00, 1.08	0.049
Race			
White (reference)	1		
Black/African American	1.58	1.52, 1.65	0.000
Asian/Pacific Islander	1.27	1.06, 1.53	0.010
American Indian/Alaska Native	0.81	0.76, 0.86	0.000
Ethnicity			
Non-Hispanic (reference)	1		
Hispanic	1.12	1.06, 1.18	0.000
Marital status			
Married (reference)	1		
Never married	1.70	1.63, 1.76	0.000
Separated	1.60	1.47, 1.74	0.000
Widowed	1.31	1.27, 1.35	0.000
Divorced	1.41	1.35, 1.47	0.000
Domestic partner	1.09	0.33, 3.59	0.889
Insurance status			
Insured	1		
Uninsured	2.62	2.37, 2.90	0.000
Age at diagnosis	1.00	1.00, 1.00	0.027
Percent of unemployed	1.01	1.00, 1.01	0.000
Percent of households with language isolation	0.97	0.97, 0.97	0.000

With the final set of analyses, I sought to determine the significant predictors of late-stage breast cancer diagnosis by nationality (see Table 12). For women born in Haiti, the factors associated with Stage IV breast cancer were marital status and the socioeconomic indicators of poverty level and median household income. Single and widowed Haitian women were more likely than married women to be diagnosed at a late

stage (*OR* = 1.34 and 10.64, respectively) with only the widowed estimate being statistically significant ($p = 0.013$). Median household income was positively associated with late-stage diagnosis (*OR* = 1.00; $p = 0.037$), while an inverse relationship was observed for the percent of Haitian women living below poverty (*OR* = 0.64; $p = 0.067$).

Risk factors associated with an increased likelihood of late-stage breast cancer diagnosis among women born in all foreign countries excluding Haiti were marital status, race, insurance status, age at diagnosis, unemployment, acculturation, poverty status, and median household income. In terms of marital status, women who were never married, separated, widowed, or divorced were more likely than married women to be diagnosed at a later stage (*OR* = 1.61, 1.46, 1.26, and 1.22, respectively). These findings were statistically significant with *p* values less than 0.05. With regards to race, Black women born in foreign countries were more likely than white women to be diagnosed at Stage IV (*OR* = 1.34; $p = 0.002$) while the reverse was true for those identifying as Asian/Pacific Islander (*OR* = 0.84; $p = 0.000$). Age (*OR* = 1.00; $p = 0.043$), being uninsured (*OR* = 2.38, $p = 0.000$) and higher rates of unemployment (*OR* = 1.04; $p = 0.001$) were also linked with a higher likelihood of advanced diagnosis. On the other hand, the inverse was observed for foreign-born women living in areas with lower levels of language isolation (*OR* = 0.98; $p = 0.000$).

For women born in the United States, findings suggest the following variables as predictors of late-stage breast cancer diagnosis: race, ethnicity, age, marital status, insurance status, poverty status, unemployment, acculturation and screening. Hispanic women were 20% more likely than non-Hispanic women to be diagnosed at a later stage

($p = 0.000$). In terms of race, Black/African American women (OR: 1.63; $p = 0.000$) had an increased likelihood of the outcome compared to white women while the reverse was true for Asian/Pacific Islander women ($OR = 0.77$; $p = 0.000$). American women who reported a marital status of never married, separated, widowed, and divorced, were more likely than married women to experience the outcome variable ($p = 0.000$). Uninsured women were nearly three times as likely as insured women to be diagnosed at a late stage ($p = 0.000$). An increase in age and unemployment rates was also associated with an increased likelihood of late-stage breast cancer diagnosis. On the other hand, an inverse relationship was observed with regards to the outcome and acculturation ($OR = 0.97$; $p = 0.000$), poverty status ($OR = 0.99$; $p = 0.000$), and the proportion of women aged 40 years and over who received a mammogram in the last 2 years ($OR = 0.99$; $p = 0.002$).

Table 12

Significant Predictors of Late-Stage Breast Cancer by Nationality, (SEER, 1973–2011)

Predictors	*OR*	95% CI	*p* value
Haitian			
Married (reference)	1		
Never married	1.34	0.21, 8.62	0.755
Separated	0	-	0.999
Widowed	10.64	1.66, 68.28	0.013
Divorced	0	-	0.999
Percent living below poverty	0.64	0.40, 1.03	0.067
Median household income	1.00	1.00, 1.00	0.037
Foreign Born			
Married (reference)	1		
Never married	1.61	1.46, 1.78	0.000
Separated	1.46	1.21, 1.76	0.000
Widowed	1.26	1.16, 1.37	0.000
Divorced	1.22	1.07, 1.40	0.003
Domestic partner	2.21	0.27, 18.44	0.463
White (reference)	1		
Black	1.34	1.11, 1.62	0.002
Asian/Pacific Islander	0.84	0.77, 0.91	0.000
American Indian/Alaska Native	1.77	0.61, 5.15	0.296
Age at diagnosis	1.00	1.00, 1.01	0.043
Insured (reference)	1		
Uninsured	2.38	1.99, 2.85	0.000
Percent of unemployed	1.04	1.02, 1.06	0.001
Percent living below poverty	0.98	0.96, 1.00	0.062
Median household income	1.00	1.00, 1.00	0.052
Percent of households with language isolation	0.98	0.97, 0.99	0.000
U.S. Born			
Non-Hispanic (reference)	1		
Hispanic	1.21	1.12, 1.29	0.000
Married (reference)	1		
Never married	1.72	1.65, 1.79	0.000
Separated	1.63	1.48, 1.80	0.000
Widowed	1.32	1.28, 1.37	0.000
Divorced	1.44	1.37, 1.51	0.000
Domestic partner	0.84	0.20, 3.56	0.808
White (reference)	1		
Black/African American	1.63	1.56, 1.70	0.000
Asian/Pacific Islander	0.77	0.69, 0.85	0.000
American Indian/Alaska Native	1.21	1.00, 1.46	0.052
Insured reference)	1		
Uninsured	2.86	2.52, 3.24	0.000
Age at diagnosis	1.00	1.00, 1.00	0.001
Percent of unemployed	1.01	1.00, 1.02	0.000
Percent of households with language isolation	0.97	0.96, 0.97	0.000
Percent living below poverty	0.99	0.99, 1.00	0.000
Percent mammography in the last 2 years; 40 years and over	0.99	0.99, 1.00	0.002

Summary

In Chapter 4, I provided the detailed results of the analyses assessing the relationship between late-stage breast cancer diagnosis and the main variables of interest nationality and race. Findings indicated that Haitian women were less likely than U.S. born women to be diagnosed at a more advanced stage of breast cancer while the converse was true for women born in other foreign countries; these results were not statistically significant. Also found was that race, Hispanic ethnicity, marital status, insurance coverage, being unemployed and language isolation were significant predictors of late-stage breast cancer diagnosis. When stratifying by nationality, marital status and the rate of poverty were the common predictors of advanced breast cancer diagnosis among Haitian, foreign born, and U.S. born women. The final chapter will provide a discussion of these results.

Chapter 5: Discussion

Introduction

The goal of this research was to assess late-stage breast cancer diagnosis among Haitian women as compared with women born in the United States and other foreign countries. While not statistically significant, the results suggested that Haitian women were less likely than U.S.-born women to be diagnosed with breast cancer at Stage IV, while the converse was true for women born in other foreign countries. The findings also indicated that the following variables play a role in late-stage breast cancer diagnosis: race, ethnicity, marital status, health insurance, employment status, and language isolation.

Interpretation of the Findings

The first research question that I sought to answer in this study was: Is there a relationship between nationality and the likelihood of late-stage breast cancer? More specifically, my aim was to determine whether Haitian women were more likely than other nationalities to be diagnosed with breast cancer at Stage IV. While findings were not statistically significant, the analyses comparing Haitians with Americans and women born in other countries yielded results suggesting that the odds of advanced breast cancer were lower among Haitian women. Interestingly, in the regression model that did not adjust for confounders, I found Haitian women were more likely than those born in the United States to be diagnosed at a late stage; however, this relationship did not persist with the inclusion of confounding variables. Furthermore, foreign-born women had an

increased likelihood of the Stage IV breast cancer diagnosis compared to U.S.-born women, which was consistent with the findings of Ik Cho et al. (2011).

Overall, the results of this study did not confirm previous research conducted in Florida suggesting that Haitian women have a greater odds of late-stage breast cancer compared to all other racial and ethnic groups (see Kobetz, et al., 2009). One reason that could explain this discrepancy was the small sample size of Haitian women in the SEER dataset, which accounted for less than 1% of the data. Future research exploring this topic should make use of a dataset that contains a larger proportion of women born in Haiti because this may yield different results.

The second research question of this study was: What is the association between late-stage breast cancer diagnosis risk and demographics, socioeconomic factors, screening, and nationality? The findings indicated that race, ethnicity, marital status, health insurance, employment status, and language isolation were key predictors of late-stage breast cancer diagnosis. In terms of race, Black/African American and Asian/Pacific Islander women were more likely than White women to be diagnosed with advanced breast cancer with the reverse being true for American Indians/Alaska Natives. These results were consistent with those reported in previous research (CDC, 2010; Chen & Li, 2015; Ik Cho et al., 2011; National Cancer Institute, n.d.b; Newman, 2005). The findings of this study also support previous findings indicating that Hispanic women have an increased likelihood of late-stage breast cancer diagnosis compared to non-Hispanic white women (Chen & Li, 2015; Ik Cho et al., 2011). Chen and Li (2015) found that African American and Hispanic women were 30% to 60% more likely to be diagnosed

with advanced breast cancer compared with non-Hispanic Whites with higher rates observed in African American women.

Another demographic variable that I assessed in this research was marital status. Aizer et al. (2013) found that married patients were less likely to be diagnosed with advanced stages of cancer, which is consistent with the findings of this study. Interestingly, the odds of a late-stage diagnosis were greatest in the single/never married group compared to those who reported being married, suggesting a protective factor in not being single. When the risk factors of late-stage breast cancer diagnosis were stratified by nationality, marital status and poverty status were the common significant predictors for Haitian, foreign-born and U.S.-born women.

With regards to socioeconomic status, I examined the relationship between poverty level, median household income, having less than a high school diploma, employment status, and healthcare access with late-stage breast cancer diagnosis. Previous research indicated an increased risk of advanced breast cancer diagnosis with these factors (Fahui et al., 2008; Henry et al., 2011; Ik Cho et al., 2011; Mandelblatt et al., 1991). For instance, Ik Cho et al. (2011) found that the risk of developing breast cancer at a late stage increased with the presence of low socioeconomic status and low educational attainment. While the results of this study confirmed this finding, being unemployed and uninsured were the only statistically significant predictors of advanced breast cancer diagnosis in the adjusted model.

As I previously mentioned, language isolation was used as a proxy for acculturation in this study. Past studies offered limited English proficiency as a possible

reason for late-stage breast cancer diagnosis (Chavez, McMullin, Mishra, & Hubbell, 2001; De Alba et al., 2004; Goel et al., 2003; Ik Cho et al., 2011; O'Malley et al., 1999; Ramirez et al., 2000). Those findings were inconsistent with the findings of this study, which suggest an inverse relationship between acculturation and late-stage breast cancer.

Breast cancer screening is instrumental in early breast cancer diagnosis. In this study, I assessed the relationship between advanced breast cancer diagnosis and mammography rates among women aged 40 years and over. As I previously mentioned, mammography was not available at the patient level in the SEER dataset but instead was a county attribute and calculated as the percentage of women aged 40 and over in a county who followed the recommendation with regards to mammograms. One of the surprising results of this study was that mammography screening was not found to be associated with late-stage breast cancer diagnosis after controlling for all other covariates in this study; it was only significant for U.S.-born women when the analysis was stratified by nationality. The American Cancer Society (2013a) asserts that following the recommendations for breast cancer screening improves the chances of detecting the disease at an early stage. Two reasons might explain why this finding was not supported in this study. First, the county estimates for mammography were based on data from 2000. Second, the dataset did not provide screening at the patient-level. The use of more updated data or patient-level information might produce results that are consistent with previous research.

I based this study on the socio-ecological model, which postulates that there are multiple levels of influence on behavior and that there is a reciprocal causation between

the individual and the social environment (see Simons-Morton et al., 2012). The seven levels of the model informing this research were intrapersonal, interpersonal, organizational, community, public policy, physical environment, and culture (see Simons-Morton et al., 2012). Factors from each of these levels can affect a woman's screening behaviors, which can in turn influence the stage at which breast cancer is diagnosed. Due to the limited nature of the secondary dataset used in this study, it was only possible to explore variables pertaining to the public policy and culture levels. With regards to public policy, I assessed following the recommended guidelines for mammography and healthcare access. Of these two variables, being uninsured was the only statistically significant predictor of late-stage breast cancer diagnosis. Using nationality as a proxy for culture, the results of this study did not confirm an increased odds of advanced breast cancer in Haitian or other foreign-born women compared to those born in the United States.

Limitations

As I previously mentioned, the data source for this study was the SEER Program, which is based on population-based cancer registries across the United States. Among the limitations of this study was that the results may not be generalizable because SEER data represents only 28% of the U.S. population with an overrepresentation of foreign-born individuals (i.e., 17.9% SEER vs.12.8% U.S.) and minorities (Frankfort-Nachmias & Nachmias, 2008; National Cancer Institute, n.d.d). Another weakness was that there may be other variables beyond those assessed by SEER, such as lifestyle behaviors or obesity status, that may explain the relationship between the outcome and predictor variables (see

Frankfort-Nachmias & Nachmias, 2008). In addition, Frankfort-Nachmias and Nachmias (2008) argued "because researchers often cannot manipulate the independent variable, the direction of causation must be logically or theoretically inferred" (p. 133). Additionally, self-reported data lends itself to recall bias, which may have minimized the accuracy of the results (see Szklo & Nieto, 2014).

Finally, although the SEER program oversamples foreign-born and minority individuals, the sample size of Haitian women that I used in this study was significantly smaller than that of women born in other foreign countries and in the United States. Furthermore, the birthplace variable collected by the SEER program was primarily obtained through death certificates, resulting in a high proportion of missing values for patients who were alive. For instance, 62% of living versus 15% of deceased patients were missing birthplace data. This increased bias in the analysis (see Gomez, et al., 2004; Montealegre et al., 2014; Pinheiro & Bungum, 2014).

Recommendations

Breast cancer is a serious health concern and early detection increases the likelihood of survival among women (American Cancer Society, 2013a). While the findings of this research did not support an effect with regards to nationality, disparities related to race, ethnicity, and socioeconomic status persist. It is imperative to strengthen efforts aimed at reducing these health disparities and improving breast cancer screening rates among underserved populations. Several barriers to screening have been identified. Pasick and Burke (2008) found that access and limited promotion of mammograms are key barriers to screening in underserved communities. In another study using the socio-

ecological theoretical framework as a basis, Daley et al. (2011) suggested the presence of screening barriers across four levels of the model: (a) policy levels included limited funding for screening programs and follow-up testing as well as healthcare access difficulties; (b) at the community level, the authors cited cultural differences, difficulty obtaining transportation, and the fear of deportation; (c) institutional level barriers consisted of limited medical services in some areas and a limited number of physicians to provide needed medical services, such as referrals and treatment services; and (d) barriers found at the individual level were fear of being tested, poverty-related stressors, and personal behaviors impacting screening (i.e., missing appointments or refusing treatments).

Schiavo (2007) asserted that the use of theories aids in clarifying how to approach and address a health issue. Using theory to develop strategies and interventions that address a combination of these barriers to screening may prove to be successful in the continued fight against breast cancer. One such example is the CDC's National Breast & Cervical Cancer Early Detection Program (NBCCEDP), which aims to prevent breast and cervical cancers by providing underserved women with screening and diagnostic services to underserved women (CDC, 2013). This program is based on five levels of the socio-ecological model: individual, interpersonal, organizational, community and policy (see Figure 6).

Figure 6. NBCCEDP's five levels of the socio-ecological model.

At the individual level, NBCCEDP seeks to increase women's knowledge and influence their attitudes and beliefs about screening (CDC, 2013) The interpersonal aspect of the program impacts social and cultural norms by using family, friends, community health workers, patient navigators, and health care providers to assist women in overcoming barriers to screening (CDC, 2013). At the organizational level, sources, such as local health departments, urban health clinics, employers, and health systems, provide support through client and provider reminder systems, worksite policies that promote preventive care, and endorsements of the expansion of benefits for screening (CDC, 2013). The NBCCEDP's interventions at the community level include activities, such as educational campaigns and working with coalitions, to promote and expand screening resources (CDC, 2013). At the policy level, the program promotes behavior change by communicating relevant policies to community members (CDC, 2013). Addressing barriers in each of these levels has allowed the NBCCEDP to provide over

1.3 million women with breast cancer screening and diagnostic services from January 2012 to December 2016 (CDC, 2018).

The use of a rich secondary dataset such as SEER has many benefits as it does limitations. This dataset provides a significant amount of information on cancer cases across the United States; however, socioeconomic factors and lifestyle behaviors were not provided at the case level and these would be useful in gaining a better understanding of the different variables that impact late-stage breast cancer diagnosis. Also, the use of a large sample size generally strengthens the generalizability of the results. This was not the case in this study since the sample of Haitian women, the primary group of interest, was significantly smaller than the other groups explored. As a result, there may have been an effect related to nationality that was masked because the sample size was too small. In addition, there may be value in further categorizing nationality based on larger geographic groups instead of comparing one country to a group of other countries. For instance, future research could focus on comparing women born in the Caribbean to those born in African countries, South American countries, etc. Another limitation of the study was the source of nationality- the birthplace variable in SEER. The use of death certificates as a source of birthplace introduces biases to the study due to the large proportion of missing data for patients who are still living. A recommendation that could strengthen future research would be to link SEER records to either U.S. census data or Social Security Administration data, which provide more detailed information on one's place of birth.

Implications

While the primary hypothesis evaluating the association between late-stage breast cancer diagnosis and nationality did not prove to be statistically significant; the findings of this research confirmed the presence of disparities relative to socioeconomic indicators (i.e., unemployment and uninsured rates). Understanding how socioeconomic status affects breast cancer staging can assist in policy and strategy development to promote screening and improve population health outcomes. Just as smoking efforts were successfully implemented at the social level to decrease the burden of disease and improve health outcomes, cancer interventions and policies should also be considered at the social level aiming to promote a sustainable economy, environmental justice, and equal resource distribution including healthcare (Hiatt & Breen, 2008).

According to Walden University (2014) "positive social change results in the improvement of human and social conditions" (para. 4). Social change can impact various aspects of life including education, standard of living, etc. It is my hope that this research will play an important role in improving women's health. Breast cancer is a topic that has been extensively explored in the past but not a significant amount of research has focused on variations in the disease relative to nationality. Although Haitian women were not more likely than American or foreign-born women to be diagnosed at a late stage this was not the case when considering the variables race and ethnicity. Blacks, Hispanics, and Asians/Pacific Islanders continue to have a greater burden of advanced breast cancer diagnosis compared to their White counterparts. My goal relative to social change is to empower not only Haitian women but all women to take ownership of their

health and make informed decisions that will ultimately improve their lives and positively impact communities and society as a whole.

Conclusion

No woman should suffer the consequences of late-stage breast cancer diagnosis due to disparities based on nationality, race, ethnicity, or socioeconomic status. Health is a right and not a privilege. As such, every woman has the right to be healthy and to access services and treatment options that will ensure that they remain thus. Breast cancer is the second leading cause of death in American women and the first cause of death in women globally (Bray et al., 2018). By understanding all of the facets of the disease and by increasing awareness on all of the factors that impact the disease and improve outcomes for those who are impacted by it, we take a united stand in working towards a cure for breast cancer and its eradication.

References

Aizer, A. A., Chen, M.-H., McCarthy, E. P., Mendu, M. L., Koo, S., Wilhite, T. J., …Nguyen, P. L. (2013). Marital status and survival in patients with cancer. *Journal of Clinical Oncology, 31*(31), 3869-3876.

Allen, N. E., Beral, V., Casabonne, D., Sau Wan, K., Reeves, G. K., Brown, A., & Green, J. (2009). Moderate alcohol intake and cancer incidence in women. *JNCI: Journal of the National Cancer Institute*, *101*(5), 296-305. doi:10.1093/jnci/djn514

Amadou, A., Ferrari, P., Muwonge, R., Moskal, A., Biessy, C., Romieu, I., & Hainaut, P. (2013). Overweight, obesity and risk of premenopausal breast cancer according to ethnicity: A systematic review and dose-response meta-analysis. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, *14*(8), 665-678. doi:10.1111/obr.12028

American Cancer Society. (2013a). *Breast cancer facts & figures 2013-2014.* Retrieved from http://www.cancer.org/acs/groups/content/@research/documents/document/acspc-040951.pdf

American Cancer Society. (2013b). *Breast cancer overview.* Retrieved from http://www.cancer.org/Cancer/BreastCancer/OverviewGuide/breast-cancer-overview-prevention

American Cancer Society. (2013c). *Cancer facts and figures for African Americans 2013-2014.* Retrieved from

http://www.cancer.org/acs/groups/content/@epidemiologysurveilance/documents/document/acspc-036921.pdf

American Cancer Society. (2014a). *Breast cancer survival rates by stage.* Retrieved from http://www.cancer.org/cancer/breastcancer/detailedguide/breast-cancer-survival-by-stage

American Cancer Society. (2014b). *Can breast cancer be found early?* Retrieved from http://www.cancer.org/cancer/breastcancer/detailedguide/breast-cancer-detection

Amey, C. H., Miller, M. K., & Albrecht, S. L. (1997). The role of race and residence in determining stage at diagnosis of breast cancer. *Journal of Rural Health, 13*(2), 99–108.

Anderson, M. (2015). A rising share of the U.S. Black population is foreign born; 9 percent are immigrants; and while most are from the Caribbean, Africans drive recent growth. *Pew Research Center*. Retrieved from http://www.pewsocialtrends.org/2015/04/09/a-rising-share-of-the-u-s-black-population-is-foreign-born/

Barry, J., & Breen, N. (2005). The importance of place of residence in predicting late-stage diagnosis of breast or cervical cancer. *Health Place, 11*(1), 15–29. doi:10.1016/j.healthplace.2003.12.002.

Borrell, L. N., Castor, D. Conway, F. P., & Terry, M. B. (2006). Influence of nativity status on breast cancer risk among U.S. Black women. *Journal of Urban Health: Bulletin of the New York Academy of Medicine, 83*(2), 211-220. doi:10.1007/s11524-005-9014-5

Bradley, C. J., Given, C. W., & Roberts, C. (2002). Race, socioeconomic status, and breast cancer treatment and survival. *Journal of the National Cancer Institute, 94,* 490-496.

Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R., Torre, L. A., & Jemal, A. (2018). Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians, 68*, 394-424. doi: 10.3322/caac.21492

Breen, N., Cronin, K., Meissner, H. I., Taplin, S. H., Tangka, F. K., Tiro, J. A., & McNeel, T. S. (2007). Reported drop in mammography. *Cancer, 109*(12), 2405-2409. doi:10.1002/cncr.22723

Brinton, L., Richesson, D., Leitzmann, M. F., Gierach, G. L., Schatzkin, A., Mouw, T., …Lacey, J. V. (2008). Menopausal hormone therapy and breast cancer risk in the NIH-AARP diet and health study cohort. *Cancer Epidemiology Biomarkers & Prevention, 17*(11), 3150-3160. doi:10.1158/1055-9965.epi-08-0435

Brody, J. G., Rudel, R. A., Michels, K. B., Moysich, K. B., Bernstein, L., Attfield, K. R., & Gray, S. (2007). Environmental pollutants, diet, physical activity, body size, and breast cancer. *Cancer, 109*(S12), 2627-2634. doi:10.1002/cncr.22656

Brown, L. M., Gridley, G., Wu, A. H., Falk, R. T., Hauptmann, M., Kolonel, L. N., ... Ziegler, R. G. (2010). Low level alcohol intake, cigarette smoking and risk of breast cancer in Asian-American women. *Breast Cancer Research and Treatment*, *120*(1), 203-210. doi:10.1007/s10549-009-0464-4

Buchner, A., Faul, F., & Erdfelder, E. (n.d.). *G*Power.* Retrieved from http://www.psycho.uni-duesseldorf.de/aap/projects/gpower/

Burkholder, G. (2010). *Sample size analysis for quantitative studies.* Baltimore, MD: Publisher.

Byers, T. E., Wolf, H. J., Bauer, K. R., Bolick-Aldrich, S., Chen, V. W., Finch, J. L.,… Yin, X. (2008). The impact of socioeconomic status on survival after cancer in the United States. *Cancer, 113,* 582-591.

Carlson, M. D. A., & Morrison, R. S. (2009). Study design, precision, and validity in observational studies. *Journal of Palliative Medicine, 12*(1), 77-82. doi:10.1089/jpm.2008.9690

Centers for Disease Control and Prevention. (n.d.). *Prevalence and trends data.* Retrieved from http://apps.nccd.cdc.gov/brfss/display.asp?cat=WH&yr=2010&qkey=4427&state=US

Centers for Disease Control and Prevention. (2010). *Breast cancer rates by race and ethnicity.* Retrieved from http://www.cdc.gov/cancer/breast/statistics/race.htm

Centers for Disease Control and Prevention. (2013). *National Breast and Cervical Cancer Early Detection Program (NBCCEDP)- Social ecological model.* Retrieved from https://www.cdc.gov/cancer/nbccedp/sem.htm

Centers for Disease Control and Prevention. (2016). *National Breast and Cervical Cancer Early Detection Program (NBCCEDP).* Retrieved from http://www.cdc.gov/cancer/nbccedp/about.htm

Centers for Disease Control and Prevention. (2018). *National Breast and Cervical Cancer Early Detection Program (NBCCEDP)- National aggregate.* Retrieved from https://www.cdc.gov/cancer/nbccedp/data/summaries/national_aggregate.htm

Centers for Medicare & Medicaid Services. (2014). *Medicare program- General information.* Retrieved from https://www.cms.gov/Medicare/Medicare-General-Information/MedicareGenInfo/index.html

Chavez, L.R., McMullin, J. M., Mishra, S. I., & Hubbell, F. A. (2001). Beliefs matter: Cultural beliefs and the use of cervical cancer screening tests. *American Anthropologist, 103*(4), 1114–1129.

Chen, L., & Li, C. I. (2015). Racial disparities in breast cancer diagnosis and treatment by hormone receptor and HER2 status. *Cancer Epidemiology, Biomarkers & Prevention, 24*(11), 1666-1672.

Chen, S. & Parmigiani, G. (2007). Meta-analysis of BRCA1 and BRCA2 penetrance. *Journal of Clinical Oncology, 25*(11), 1329–1333.

Dai, D. (2010). Black residential segregation, disparities in spatial access to health care facilities, and late-stage breast cancer diagnosis in metropolitan Detroit. *Health Place, 16*(5), 1038–1052. doi:10.1016/j.healthplace.2010.06.012.

Daley, E., Alio, A., Anstey, E., Chandler, R., Dyer, K., & Helmy, H. (2011). Examining barriers to cervical cancer screening and treatment in Florida through a socio-ecological lens. *Journal of Community Health*, *36*(1), 121-131. doi:10.1007/s10900-010-9289-7

Daling, J. R., Malone, K. E., Doody, D. R., Johnson, L. G., Gralow, J. R., & Porter, P. L. (2001). Relation of body mass index to tumor markers and survival among young women with invasive ductal breast carcinoma. *Cancer, 92*(4), 720-729. doi:10.1002/10970142(20010815)92:4<720::aid-cncr1375>3.0.co;2-t

De Alba, I., Sweningson, J. M., Chandy, C., & Hubbell, F. A. (2004). Impact of English language proficiency on receipt of Pap smears among Hispanics. *Journal of General Internal Medicine, 19*(9), 967–970.

DeSantis, C., Ma, J., Bryan, L., & Jemal, A. (2014). Breast cancer statistics, 2013. *CA: A Cancer Journal for Clinicians, 64*(1), 52-62.

DeSantis, C., Siegel, R., Bandi, P., & Jemal, A. (2011). Breast cancer statistics, 2011. *CA: A Cancer Journal for Clinicians, 61*(6), 409-418.

Edwards, B. K., Noone, A.-M., Mariotto, A. B., Simard, E. P., Boscoe, F. P., Henley, S. J., … Ward, E. M. (2014). Annual report to the nation on the status of cancer, 1975-2010, featuring prevalence of comorbidity and impact on survival among persons with lung, colorectal, breast, or prostate cancer. *Cancer, 120*, 1290-1314. doi:10.1002/cncr.28509

Edwards, B. K., Ward, E., Kohler, B. A., Eheman, C., Zauber, A. G., Anderson, R. N., …Ries, M. S. (2010). Annual report to the nation on the status of cancer, 1975-2006, featuring colorectal cancer trends and impact of interventions (risk factors, screening, and treatment) to reduce future rates. *Cancer, 116*(3), 544-573. doi:10.1002/cncr.24760

Eliassen, A. H., Colditz, G. A., Rosner, B., Willett, W. C., & Hankinson, S. E. (2006). Adult weight change and risk of postmenopausal breast cancer. *JAMA, 296*(2), 193-201.

Ellis, P. D. (2010). *The essential guide to effect sizes: Statistical power, meta-analysis, and the interpretation of research results.* Cambridge, NY: Cambridge University Press.

Fahui, W., McLafferty, S., Escamilla, V., & Lan, L. (2008). Late-stage breast cancer diagnosis and health care access in Illinois. *Professional Geographer, 60*(1), 54-69. doi:10.1080/00330120701724087

Frankfort-Nachmias, C., & Nachmias, D. (2008). *Research methods in the social sciences* (7th ed.). New York, NY: Worth.

Garfinkel, L., Boring, C. C., & Heath, C. W. (1994). Changing trends: An overview of breast cancer incidence and mortality. *Cancer, 74*(S1), 222-227. doi:10.1002/cncr.2820741304

Gaudet, M. M., Gapstur, S. M., Sun, J., Diver, W. R., Hannan, L. M., & Thun, M. J. (2013). Active smoking and breast cancer risk: Original cohort data and meta-analysis. *Journal of the National Cancer Institute, 105*(8), 515-525. doi:10.1093/jnci/djt023

Glanz, K., & Bishop, D. B. (2010). The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health, 31*, 399-418.

Goel, M. S., Wee, C. C., McCarthy, E. P., Davis, R. B., Ngo-Metzger, Q., & Phillips, R. S. (2003). Racial and ethnic disparities in cancer screening: The importance of foreign birth as a barrier to care. *Journal of General Internal Medicine, 18*(12), 1028–1035.

Gomez, S. L., Glaser, S. L., Kelsey, J. L., & Lee, M. M. (2014). Bias in completeness of birthplace data for Asian groups in a population-based cancer registry (United States). *Cancer Causes & Control, 15*(3), 243-253.

Henry, K., Boscoe, F., Johnson, C., Goldberg, D., Sherman, R., & Cockburn, M. (2011). Breast cancer stage at diagnosis: Is travel time important? *Journal of Community Health*, *36*(6), 933-942. doi:10.1007/s10900-011-9392-4

Hiatt, R. A. & Breen, N. (2008). The social determinants of cancer. A challenge for transdisciplinary science. *American Journal of Preventive Medicine, 35*(2S), S141-S150.

Howe, H. L., Wingo, P. A., Thun, M. J., Ries, L. A. G., Rosenberg, H. M., Feigal, E. G., & Edwards, B. K. (2001). Annual report to the nation on the status of cancer (1973-1998), featuring cancers with recent increasing trends. *Journal of the National Cancer Institute, 93*(11), 824-842.

Hruschka, D. J., & Hadley, C. (2008). A glossary of culture in epidemiology. *Journal of Epidemiology & Community Health, 62,* 947-951.

IBM. (2016). SPSS Grad Pack 24.0 for Windows (Version 24.0) [Computer software]. Chicago, IL: IBM.

Ik Cho, Y., Johnson, T. P., Barrett R. E., Campbell, R. T., Dolecek, T. A., & Warnecke, R. B. (2011). Neighborhood changes in concentrated immigration and late stage breast cancer diagnosis. *Journal of Immigrant Minority Health, 13,* 9-14. doi:10.1007/s10903-010-9339-3

John, E. M., Sangaramoorthy, M., Phipps, A. I., Koo, J., & Horn-Ross, P. L. (2011). Adult body size, hormone receptor status, and premenopausal breast cancer risk in a multiethnic population. *American Journal of Epidemiology, 173*(2), 201-216. doi:10.1093/aje/kwq345

Kobetz, E., Menard, J., Barton, B., Maldonado, J., Diem, J., Auguste, P., & Pierre, L. (2010). Barriers to breast cancer screening among Haitian immigrant women in Little Haiti, Miami. *Journal of Immigrant & Minority Health*, *12*(4), 520-526. doi:10.1007/s10903-010-9316-x

Kobetz, E., Menard, J., Barton, B., Pierre, L., Diem, J., & Auguste, P. D. (2009). Patne en Aksyon: Addressing cancer disparities in Little Haiti through research and social action. *American Journal of Public Health, 99*, 1163-1165.

Kobetz, E., Mendoza, A. D., Barton, B., Menard, J., Allen, G., Pierre, L., … McCoy, C. (2010). Mammography use among Haitian women in Miami, Florida: An opportunity for intervention. *Journal of Immigrant & Minority Health, 12*(3)*,* 418-421.

Lacey, J., Kreimer, A., Buys, S., Marcus, P., Chang, S. C., Leitzmann, …Hartge, P. (2009). Breast cancer epidemiology according to recognized breast cancer risk

factors in the Prostate, Lung, Colorectal and Ovarian (PLCO) Cancer Screening Trial Cohort. *Cancer, 9*(1), 84. doi:10.1186/1471-2407-9-84.

Lantz, P. M., Mujahid, M., Schwartz, K., Janz, N. K., Fagerlin, A., Salem, B., ... Katz, S. J. (2006). The influence of race, ethnicity, and individual socioeconomic factors on breast cancer stage at diagnosis. *American Journal of Public Health*, *96*(12), 2173-2178. doi:10.2105/AJPH.2005.072132

Lim, J. (2010). Linguistic and ethnic disparities in breast and cervical cancer screening and health risk behaviors among Latina and Asian American women. *Journal of Women's Health (15409996)*, *19*(6), 1097-1107. doi:10.1089/jwh.2009.1614

Linton, M.J., (2013). Comparison of two breast carcinomas: Ductal carcinoma in situ and lobular carcinoma in situ. *Medsurg Nursing, 22*(4), 237- 240.

Maloney, N., Koch, M., Erb, D., Schneider, H., Goffman, T., Elkins, D., & Laronga, C. (2006). Impact of race on breast cancer in lower socioeconomic status women. *Breast Journal*, *12*(1), 58-62.

Mandelblatt, J., Andrews, H., Kerner, J., Zauber, A., & Burnett, W. (1991). Determinants of late stage diagnosis of breast and cervical cancer: The impact of age, race, social class, and hospital type. *American Journal of Public Health, 81*(5), 646-649.

Mann, C. J. (2003). Observational research methods. Research design II: Cohort, cross sectional, and case-control studies. *Emergency Medicine Journal, 20,* 54-60. doi: 10.1136/emj.20.1.54

McCarthy, A. M., Jianing, Y., & Armstrong, K. (2015). Increasing disparities in breast cancer mortality from 1979 to 2010 for US Black women aged 20 to 49 years. *American Journal of Public Health*, *105,* S446-S448. doi:10.2105/AJPH.2014.302297

Meade, C. D., Menard, J., Thervil, C., & Rivera, M. (2009). Addressing cancer disparities through community engagement: Improving breast health among Haitian women. *Oncology Nursing Forum, 36*(6), 716-722. doi:10.1188/09.ONF.716-722

Montealegre, J. R., Zhou, R., Amirian, E. S., & Scheurer, M. E. (2014). Uncovering nativity disparities in cancer patterns: A multiple imputation strategy to handle missing nativity data in the SEER data file. *Cancer, 120*(8), 1203–1211. doi:10.1002/cncr.28533

National Cancer Institute. (n.d.). *About the SEER registries.* Retrieved from https://seer.cancer.gov/registries/

National Cancer Institute. (n.d.a). *Breast cancer.* Retrieved from http://www.cancer.gov/cancertopics/types/breast

National Cancer Institute. (n.d.b). *Cancer staging.* Retrieved from http://www.cancer.gov/cancertopics/factsheet/detection/staging

National Cancer Institute. (n.d.c). *Metastatic cancer.* Retrieved from http://www.cancer.gov/cancertopics/factsheet/Sites-Types/metastatic

National Cancer Institute. (n.d.d). *Population characteristics.* Retrieved from http://seer.cancer.gov/registries/characteristics.html

National Cancer Institute. (n.d.e). *Screening and testing to detect breast cancer.* Retrieved from http://www.cancer.gov/cancertopics/screening/breast

National Cancer Institute. (2012a). *Breast cancer risk in American women.* Retrieved from http://www.cancer.gov/cancertopics/factsheet/Detection/probability-breast-cancer

National Cancer Institute. (2012b). *Inflammatory breast cancer.* Retrieved from http://www.cancer.gov/cancertopics/factsheet/Sites-Types/IBC

Nationality. (n.d.). In *Merriam-Webster's online dictionary*. Retrieved from http://www.merriam-webster.com/dictionary/nationality

Newman, L. A. (2005). Breast cancer in African-American women. *The Oncologist, 10,* 1-14.

Nickels, S., Truong, T., Hein, R., Stevens, K., Buck, K., Behrens, S., ... Southey, M. C. (2013). Evidence of gene-environment interactions between common breast cancer susceptibility loci and established environmental risk factors. *Plos Genetics*, *9*(3), 1-14.

Nimptsch, K., & Pischon, T. (2015). Body fatness, related biomarkers and cancer risk: An epidemiological perspective. *Hormone Molecular Biology & Clinical Investigation*, *22*(2), 39-51. doi:10.1515/hmbci-2014-0043

Nwosu, C., & Batalova, J. (2014). Haitian immigrants in the United States. *The Online Journal of the Migration Policy Institute.* Retrieved from http://www.migrationpolicy.org/article/haitian-immigrants-united-states

O'Malley, A. S., Kerner, J., Johnson, A. E., & Mandelblatt, J. (1999). Acculturation and breast cancer screening among Hispanic women in New York City. *American Journal of Public Health, 89*(2), 219–227.

Organisation for Economic Co-operation and Development. (2003). *Immigrant population.* Retrieved from http://stats.oecd.org/glossary/detail.asp?ID=1284

Pasick, R. J., & Burke, N. J. (2008). A critical review of theory in breast cancer screening promotion across cultures. *Annual Review of Public Health, 29,* 351-368.

Phillips, A. A., Jacobson, J. S., Magai, C., Consedine, N., Horowicz-Mehler, N. C., & Neugut, A. I. (2007). Cancer incidence and mortality in the Caribbean. *Cancer Investigation, 25*(6), 476-483.

Pinheiro, P. S., Bungum, T. J., & Jin, H. (2014), Limitations in the imputation strategy to handle missing nativity data in the Surveillance, Epidemiology, and End Results program. *Cancer*, 120: 3261–3262. doi: 10.1002/cncr.28866

Ramirez, A. G., Suarez, L., Laufman, L., Barroso, C., & Chalela, P. (2000). Hispanic women's breast and cervical cancer knowledge, attitudes, and screening behaviors. *American Journal of Health Promotion, 214*(5):292–300.

Reeves, G. K., Pirie, K., Beral, V., Green, J., Spencer, E., & Bull, D. (2007). Cancer incidence and mortality in relation to body mass index in the Million Women Study: Cohort study. *British Medical Journal, 335*(7630), 1134. doi:10.1136/bmj.39367.495995.AE

Rose, D. P., & Vona-Davis, L. (2010). Interaction between menopausal status and obesity in affecting breast cancer risk. *Maturitas*, *66*(1), 33-38. doi:10.1016/j.maturitas.2010.01.019

Rosenberg, L., Boggs, D. A., Bethea, T. N., Wise, L. A., Adams-Campbell, L. L., & Palmer, J. R. (2013). A prospective study of smoking and breast cancer risk among African-American women. *Cancer Causes & Control: CCC*, *24*(12), 2207-2215. doi:10.1007/s10552-013-0298-6

Schiavo, R. (2007*). Health communication: From theory to practice.* San Francisco, CA: Jossey-Bass.

SEER Training Modules, Breast Cancer. (n.d.). *U. S. National Institutes of Health, National Cancer Institute.* Retrieved from http://training.seer.cancer.gov/

Sheperis, C.J. (n.d.). *Understanding power and effect size: A practical overview*. Retrieved from http://mym.cdn.laureate-media.com/Walden/RSCH/8250/10/mm/power_and_effect_size.html

Shuen, A. Y., & Foulkes, W. D. (2011). Inherited mutations in breast cancer genes: Risk and response. *Journal of Mammary Gland Biology and Neoplasia, 16*(1), 3-15. doi:10.1007/s10911-011-9213-5

Simons-Morton, B., McLeroy, K. R., & Wendel, M. L. (2012). *Behavior theory in health promotion practice and research.* Burlington, MA: Jones & Bartlett Learning.

Sweeny, C., Baumgartner, K. B., Byers, T., Giuliano, A. R., Herrick, J. S., Murtaugh, M. A., & Slattery, M. (2008). Reproductive history in relation to breast cancer risk

among Hispanic and non Hispanic White women. *Cancer Causes Control, 19*(4), 391-401. doi:10.1007/s10552-007-9098-1

Szklo, M., & Nieto, F. J. (2014). *Epidemiology: Beyond the basics* (3rd ed.). Sudbury, MA: Jones and Bartlett.

Thomson, M. D., & Hoffman-Goetz, L. (2009). Defining and measuring acculturation: A systematic review of public health studies with Hispanic populations in the United States. *Social Science & Medicine, 69*, 983-991. doi:10.1016/j.socscimed.2009.05.011

Tian, N., Wilson, J. G., & Zhan, F. B. (2011). Spatial association of racial/ethnic disparities between late-stage diagnosis and mortality for female breast cancer: Where to intervene? *International Journal of Health Geographics, 10*(1), 24-32. doi:10.1186/1476-072X-10-24

Ursin, G., Bernstein, L., Lord, S. J., Karim, R., Deapen, D., Press, M. F., & Daling, J. R. (2005). Reproductive factors and subtypes of breast cancer defined by hormone receptor and histology. *British Journal of Cancer, 93*(3), 364-371. doi:10.1038/sj.bjc.6602712

U.S. National Library of Medicine. (2014). *Health disparities.* Retrieved from http://www.nlm.nih.gov/medlineplus/healthdisparities.html

Vona-Davis, L. & Rose, D. P. (2009). The influence of socioeconomic disparities on breast cancer tumor biology and prognosis: A review. *Journal of Women's Health, 18*(6), 883-893.

Warner, E. T., Tamimi, R. M., Hughes, M. E., Ottesen, R. A., Wong, Y., Edge, S. B., ... Partridge, A. H. (2012). Time to diagnosis and breast cancer stage by race/ethnicity. *Breast Cancer Research And Treatment*, *136*(3), 813-821. doi:10.1007/s10549-012-2304-1

Walden University. (2014). *Vision, mission, and goals.* Retrieved from http://catalog.waldenu.edu/content.php?catoid=40&navoid=4981

Walden University. (2015). *Institutional review board for ethical standards in research.* Retrieved from http://researchcenter.waldenu.edu/Office-of-Research-Integrity-and-Compliance.htm

Walsh, T. & K. M.-C. (2007). Ten genes for inherited breast cancer. *Cancer Cell, 11,* 103-105. doi:10.1016/j.ccr.2007.01.010

World Health Organization. (2018). *Health topics- Risk factors.* Retrieved from http://www.who.int/topics/risk_factors/en/